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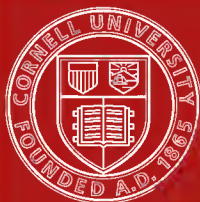
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# AMERICAN RAILWAY MANAGEMENT.

*ADDRESSES DELIVERED BEFORE THE AMERICAN  
RAILWAY ASSOCIATION, AND MISCELLANEOUS  
ADDRESSES AND PAPERS.*

BY

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## PREFACE.

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THIS is a collection of addresses delivered at the semi-annual meetings of the American Railway Association from 1890 to 1896, and of other occasional addresses. They relate to matters connected with the management of railways in the United States, and have some value, either as indicating opinions prevalent at the time that they were prepared, or as bearing upon the development of the American railway system from its inception to the present time. Though, for the most part, produced upon the spur of the moment, as opportunities offered during a busy life, some of them contain information gathered from various sources which cannot be so readily obtained elsewhere. For these reasons it is hoped that their republication in more accessible form will prove justifiable.

The discussion of the Inter-State Commerce Commission Reports to 1894, contained in the address on "Rates of Transportation and Cost of Service on American Railroads," delivered in April, 1895, has been extended to include the later reports in the concluding article recently written for the purpose, entitled "Value of Railroad Property in the United States, as shown by the Report of 1896 of the Inter-State Commerce Commission."

ATLANTA, GA., July 30, 1897.



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# ADDRESSES

DELIVERED BEFORE THE

## AMERICAN RAILWAY ASSOCIATION.

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### FIELD OF USEFULNESS OF THE ASSOCIATION.

(April 9, 1890, at Hotel Brunswick, New York.)

I avail myself of this opportunity to express my appreciation of the honor which has been conferred upon me in thrice electing me to the position which I am now about to vacate, and it seems to me that I can do so in no more fitting way than by describing the field of usefulness which, in my opinion, the General Time Convention could properly occupy.

Originating in the necessity for conforming local timetables to continuous train service, the Northern and the Southern Conventions were so impressed with the inconveniences of local standards of time that they attempted, independently of each other, to establish a uniform standard. In making this attempt the two conventions were led to co-operation with such successful results that they next joined in the establishment of uniform train signals. The next step was to a uniform code of train rules. By this time the advantages attendant upon co-operation became so apparent that a move was made toward consolidation, which was effected at Cincinnati

in 1886, and the General Time Convention as thus organized completed the Code of Train Rules which is now acknowledged as the standard to which railroad practice must conform.

In carrying out these reforms the General Time Convention has developed into a well organized association representing the operating departments of most of the railroads in the country.

As a member of the committee originally entrusted with the consolidation of the two conventions; as the official head of this consolidated Convention for the past three years, I have watched its development with interest. I have seen it gradually transformed from a sort of mass meeting for the consideration of time-tables into a deliberative body of representative men, gathered together, from the length and breadth of the land, skilled in every branch of railroad management; a body with a permanent organization prepared to preserve and carry forward the experiences accumulated from year to year. I recognize the powerful forces inherent in such an organization and the useful purposes which it can fulfill if directed aright.

It is indeed a proper time for such reflections, for, in my opinion, the General Time Convention has now reached a critical period in its development. Originated, as I have already said, for a minor purpose, it has been engaged in the solution of a few desultory problems that have been presented to it. One after another these problems have been disposed of, until at this meeting there is substantially but one subject before it—that of car service.

Suppose that subject disposed of, and for what purpose shall the General Time Convention exist? Fortunately it has now been directed to a subject perhaps equal in importance to any which has hitherto demanded its attention—that of safety appliances—one which contains matter of sufficient moment; let us hope, to maintain our interest in the immediate future of our association.

But I ask you if the time has not arrived to determine

whether we shall continue to drift along with each varying current, or whether we shall map out a course for ourselves, and resolutely pursue it. To my mind, this association of ours is equal to the consideration of more than one subject at a time, equal indeed to as many as may present themselves in its legitimate field of operations. I say its legitimate field, and I use that expression advisedly, for I am of the opinion that it should be restricted to the consideration of subjects in which the members have a common interest. This is true of standard time, of uniform signals and train rules, of car service and of safety appliances. But those subjects are outside of its field which involve other considerations than those relating solely to railroad practice ; for instance, questions of policy with reference to traffic which may arouse individual contentions and competitions between members of the association or between the communities which they serve, and which will dominate their discussion even though they do not appear to do so. The issues involved in the questions hitherto before us have been mainly due to a difference of opinion capable of adjustment either by argument or by proof. I maintain, therefore, that the General Time Convention should avoid any subject relating to traffic or revenue, and should confine itself to matters of operation and economy. The field is large enough to occupy all the time that we can devote to the business of our association, and includes matters well worthy of our attention.

Assuming then that our proper field is that of operation and management, as distinguished from traffic and revenue, we have next to consider how these matters should be treated. I should say either as they affect our stockholders, or our employees, or the public, for we must bear in mind that, as railroad managers, we occupy this threefold relation. It is in this triple relation that we have considered the questions that have hitherto been presented to us, and that we have now to approach the subject of safety appliances. Treated in this way, there will

be no lack of matter for our deliberations. The march of progress has not yet brought our railroad systems to that condition which leaves nothing further to be desired, and there are improvements in methods and appliances now passing from the experimental stage, in which they are properly the subjects for consideration in technical associations, to the stage in which the responsible managements of our railroad systems must decide whether they will recognize them as sufficiently valuable for general adoption. So it has been with the substitution of steel for iron rails, and iron for wooden bridges, with the establishment of sleeping car lines, with the adoption of continuous air brakes and automatic couplers on passenger trains, and so it will be with similar improvements in methods and appliances.

As railroad managers we also handle men as well as material and appliances, and here is a field for our efforts as yet scarcely touched, at least in the way in which I would like to see it treated.

A railroad system, properly organized, has its staff, field and line officers, its supply departments, its inspectors, its divisions and districts of operation; in a word, it is an army, whose office is not to slay, not to devastate, but to transport the people and products of a country. This is its function, and to this end all of its efforts are directed; and to accomplish this end successfully discipline is as essential as in a militant organization. With the growth of our business, with the extending area of operations and the increasing number and speed of trains, there must be an increased strictness of discipline and an enforcement of that discipline by penalties as irksome to the employee as in a military army the incessant drill and the penal regulations are to the soldier. A resistance to restraint and reproof, a mutinous tendency, a disposition to oppose the interests of the company in matters indifferent to the employee have been, I fear, encouraged by labor organizations, whose ostensible objects are the pecuniary, moral

and social welfare of their members. If this spirit is to prevail, the maintenance of that discipline will be imperilled, which is as essential for their own safety as for the protection of the lives of our passengers and the property of our stockholders.

The rapid increase of railroad mileage and tonnage has led to the enlistment of a mob of recruits in our industrial army as unused to discipline and to obedience to control as they are averse to them. In this emergency railroad managers have been compelled to take this material as it comes to their hands, and to make the best possible use of it ; but with a decreasing ratio of railroad construction this necessity will also decrease, and we will then have time at our disposal to drill the disorderly and disaffected members into a proper state of discipline and to dismiss the incapables from the ranks. For this work to be successful we must arouse among them a feeling of pride in the organization to which they belong, of respect for their officers, and of interest in the work which they have in hand, which is known as *esprit de corps*; a spirit which has carried armies through privation, suffering and defeat to victory, and without which no body of men can be controlled under adverse circumstances. How to do this with the opposition of labor unions better organized than we are is indeed a subject well worth our consideration, and one which we will have to face sooner or later, whether we like it or not. It would be out of place for me to do more than to indicate the direction which the discussion of this subject would take. I will suggest, however, that when the rapid absorption of outsiders into the railroad ranks shall cease and all questions of wages shall have been approximately adjusted, whether by arbitration or by the effect of supply and demand, the time in my opinion will have arrived to determine the relations between a railroad corporation and its employees which should ensure the best results of their labor to themselves, to the company and to the public. Here will come in questions as to permanency of

employment, insurance against injuries, sickness and old age, priority of promotion, recognition of meritorious services, and protection against abuse on the one hand, and on the other, questions of training for special duties, obedience to orders, respect to superiors, &c., which have occupied the attention of military men for thousands of years, and which have led to the application of certain recognized principles to an army of fighting men that are in many respects as applicable to an army of railroad men.

Although I know that I have extended these remarks to a considerable length, I feel that I have not covered the ground to my satisfaction until I have touched upon one more point, and that is our relations to the public; for I believe that in this respect also there are matters worthy of consideration by the General Time Convention.

We are but too unpleasantly aware of the attitude assumed toward railroad companies by the general public. Let this have arisen as it may, whether because of watered stocks or political demagoguery or the discrimination between shippers and communities in the matter of rates, we all know of its existence, we feel it but too sensibly in Federal and State legislation and in municipal ordinances, in litigation, in political speeches, in newspaper abuse. Must this condition of affairs continue? Is it the relation which must of necessity be maintained between the nation, the cities, the people who have been made prosperous by means of railroads to an extent never dreamed of before, and the companies through whose efforts these great results have been obtained? To my mind, if the triumphs of war have earned for the soldier the applause of his fellow-citizens, the triumphs of peace have at least earned for the railroad man the right to decent treatment at their hands. And I hope and believe that there will be an improvement in this respect with the disappearance of animosity over disputes about matters of traffic and revenue.

The great contention as to discrimination in rates is

nearing an end, for the margin between the rate and the cost per ton mile has now narrowed down to a survival of the fittest. The determination on the part of the politicians to insure competition has but proved the truth of Stephenson's assertion that where competition is possible combination is probable; the prevention of pools has hastened the absorption of the weaker by the stronger corporations, and the time is approaching when one of two solutions of the railroad transportation problem must be attempted: either a government management or a territorial division among private corporations. In no other way can the difference between the rate and the cost per ton mile be reduced to a minimum; that minimum being the lowest acceptable return upon the capital invested. When that time arrives the era of the railroad projector, of the manipulator of stocks, and of the soliciting agent will have passed away. When that millennium has been attained the railroad manager will still have problems to solve relating to the safety of life and property, to the commodious and speedy transportation of passengers, and to the prompt dispatch of freight. In the solution of problems of this character, relating to the public, as well as those relating to our employees and to our stockholders, there is a field for the General Time Convention, and it is to this field that I undertake to direct your attention in expressing my appreciation of the honor conferred on me by electing me three times as president of your association.

## DISCIPLINE ON RAILROADS.

(October 8, 1890, at Hotel Brunswick, New York.)

In the address which I made in this room, just a year ago, I called your attention to a matter about which I propose to speak to-day at greater length, and I will preface my remarks by a quotation from that address:

“A railroad system properly organized, has its staff, field and line officers, its supply departments, its inspectors, its divisions and districts of operation; in a word, it is an army, whose office is not to slay, not to devastate, but to transport the people and products of a country. This is its function, and to this end all of its efforts are directed; and to accomplish this end successfully discipline is as essential as in a militant organization.”

This is my theme to-day, the subject of Discipline, which I shall endeavor to place before you as it appears to me; to impress you with the importance of viewing it in a broad light as affecting the interests of the public, and of the railroad employee as well as of the stockholder.

I am the more impelled to do this for the reason that the purposes for which it is sought to maintain efficient discipline upon a railroad are not clearly understood by those who are subjected to it, nor are they always kept in view by those whose duty it is to enforce them.

To arrive at such an understanding it may be well to recognize what is meant by discipline, in its broadest sense.

Discipline really means a teaching or training, and those who are the subjects of discipline, those who are being trained or taught, are known as disciples or pupils. The object then which is to be attained by discipline is the teaching or training of certain persons, that they may



be the better fitted for the work which they are to undertake.

This is the starting point from which I propose to discuss the question of discipline on a railroad, that is, to look upon it as the training of certain persons for a special purpose, the safe and speedy transportation by rail of passengers and freight, and the persons whom we have in view, the railroad employees, we are to consider as pupils who are to be instructed in the efficient performance of this very important work.

They come from the ordinary walks of life, generally before they have attained their majority, not only ignorant of railroad rules and regulations, but with minds unformed, and possibly with habits already acquired of which they must divest themselves to acceptably discharge the duties required of them.

They make their appearance in the railroad ranks as track hands, as brakemen or switchmen, as engine wipers or as messenger boys, and are the raw materials out of which are to be made section foremen and roadmasters, conductors, operators, dispatchers and masters of transportation, locomotive engineers and master mechanics, and I have only to look around me to see that from their number, by a process of natural selection, are obtained many of those who have risen to the highest offices in the railroad service.

What can I say to impress more forcibly upon you the importance of having correct ideas with reference to railroad discipline ?

Beginning with the raw material which is to be moulded into serviceable shape, we have first to ask whether this material should not be picked over; that selected which seems best adapted for our service, and that rejected which is evidently unfitted for it; whether that selection or weeding out will not be facilitated, and the operation made easier both to those who are to teach and to those who are to be taught, if a preliminary examination were made es-

sential to the employment of all novices in transportation service. Such an examination to be of value, should take the form of an inquiry into the physical, mental and moral characteristics of the applicant in a general way with some farther tests of his suitability for the particular branch of the service in which he seeks employment. Looking to the physical examination it is plain to us all that a man who is deaf or blind is out of place in transportation service, and that defective sight and hearing should be detected before they cause the loss of life or property. The examination might also include a search for serious defects in other organs than those of sound and vision. The mental examination ought to cover certain educational requirements, at least that the applicant should be able to read and write the English language, and have some knowledge of the ground rules of arithmetic. The moral examination should provide for some satisfactory evidence as to the reputation of the applicant for honesty and sobriety.

Such a preliminary examination as I have indicated could fairly be required of one who sought a position in which at an early stage in his career he would be called on for some exercise of the qualities I have mentioned.

The flagman, the fireman, the telegraph operator should be able to see and to hear, to read and to write, to keep sober and to tell the truth, and it is due to the public that they serve, and to the employees with whom they serve, that their ability to do these things should be tested before they are tried in actual service and found wanting.

The establishment of preliminary examinations should assure to those who had passed them a prescriptive right to employment as opportunity offered, and after it had become well known that the holder of a pass certificate would have precedence for employment over those who were not so equipped there would be no difficulty in obtaining material so selected for training in railroad service.

With the admission of a raw recruit into the railroad

ranks should begin his special training for the particular branch in which he is to serve; the acquisition of manual dexterity in his calling, of aptness in observing and imitating the operations in which he is to take a part, and especially of a knowledge of the rules and regulations which are to guide his conduct. Our experience in railroad management is leading us to recognize more and more the importance of a thorough knowledge of rules by those who are to obey them. Indeed, what kind of obedience can be expected where ignorance prevails? Take, for instance, the Standard Train Rules. Recall the labor expended upon them that they might fulfill their purpose and be clearly understood. They are to guide the train dispatcher, the operator, the engineer, the conductor, the flagman, and in the performance of their duties those rules are to be strictly observed. How can you demand this of men who do not know what is expected of them? I therefore insist that the regulations of the company, and especially the train rules, should be taught to the beginner, and that his proficiency in them should be essential not only to his advancement but to his continuance in the service. This will call for examination on this particular subject when time enough has elapsed after his entry into the service for any man to have acquired a knowledge of them who had been able to pass the preliminary examination. If these rules are of such importance as to have occupied for months the minds of some of our ablest railroad managers in order to make them a safeguard against accidents, then it is not asking too much of the employee to show that he knows how to conform to them before placing him where a failure to do so invites disaster.

But knowing is one thing and doing another. Many men are able to do things which through indifference or neglect or recklessness they fail to do, and it is not enough that we assure ourselves that our men know what to do to avoid accidents; we must endeavor to be equally sure that

they will apply that knowledge at the proper time. This we should make it their interest to do by the time-honored inducements of reward and punishment. From the highest heavens to the lowest depths this has been the mainstay of lawgivers, both human and divine, and it must also be ours to ensure the observance of these rules by those who, in the absence of such inducements, would not respect them. We have something of this sort at present. We offer promotions and a choice of positions to those who do well, and resort to fines, suspensions or dismissal of those who do badly. But for a system of rewards and punishments to be effective it must be a system indeed. It must as far as possible protect the employee against the results of malice or bad temper or hasty decisions on the part of his immediate superior. A man should lose neither his job nor his pay except for a clearly-established violation of a rule with which he is familiar; his side of the case should be heard before judgment is pronounced, and the penalty should be graded to suit the extent of his offence. All this requires patience and self-restraint on the part of his judges, and if they are lacking in those qualities not justice but injustice will often be done. It is not sufficient, then, to publish a well-devised set of train rules and feel that your duty as to enforcing them has been done if you suspend or dismiss some one whenever there is an accident. Your duty requires you first to see to it that every man put under those rules shall know what is expected of him; next, that there shall be such an inspection and supervision of their work that violation of rules are detected before a bridge falls down or a derailment takes place or a collision occurs; and, farther, that punishment shall follow swiftly upon the heels of the offence, not capriciously nor hastily nor abusively, but that the violation shall be brought home so clearly to the offender that he has to acknowledge his shortcoming and in some way to suffer for it. It is not so necessary that the penalty be severe as that it shall be certainly and justly

inflicted. As I have already said, this calls for patience and self-restraint on the part of his judges. But surely the purpose in view is worth all that it will cost, and it is part of the value of true discipline that it acts beneficially upon the superior as well as upon those placed under him. A proper sense of discipline will prevent abusive language or tyrannical conduct as well as disrespect or disobedience. Repeating the language of my previous address, "for this work to be successful we must arouse among our men a feeling of pride in the organization to which they belong, of respect for their officers, and of interest in the work they have in hand, which is known as *esprit du corps*; a spirit which has carried armies through privations, suffering and defeat to victory, and without which no body of men can be controlled under adverse circumstances."

This is the spirit which impels the flagman to go back in snow or rain to stop an approaching train instead of skulking in the rear of the caboose; which nerves the engineer to stand at the throttle lever when danger is impending rather than to leap for life and leave his passengers to their fate. This is the spirit which results from training mind and body to do the right thing at the right time, that true discipline which is the foundation of efficient service.

I shall not enter into details as to methods. The time is not sufficient to do so, particularly as there is yet another aspect of the subject which I wish to present before I close.

For some reasons in some quarters there is a disposition to resent the attempt to enforce discipline and obedience to rules by any penalties, yet as I have said no code of laws has ever been efficiently administered except through the medium of rewards and punishments. The object to be attained is one in which the welfare of the employee is at stake as well as the lives of passengers and the property of the company. It is this view which should be impressed upon the minds of the men as the aim and end

of rules, that so far from discipline being a degradation to a right thinking man, to one who means to do his duty, it is intended to lift him to a higher grade of usefulness by such training as will the better fit him for it. If with this idea is also conveyed a sense of just treatment, we may hope that these erroneous impressions will be removed, and that employees will sustain their officers in their efforts to ensure a prompt compliance with rules, and an impartial and conscientious enforcement of discipline.

The traveling public has also an interest in the enforcement of discipline, which is brought home to every passenger who has been an eye-witness to a train wreck, or perhaps a bodily sufferer from one. It is safe to say that in a majority of cases the immediate cause has been the neglect of duty by an employee. The railroad company may invest millions in bridges, rails, signals and equipment, all of the most approved design and construction; the management may keep up with the times in the adoption of devices and rules for the protection of trains, and yet all this expenditure, all this care and forethought be neutralized by the laziness or recklessness of an employee, and a fearful disaster ensue. Here it is that we should call public opinion to our support. Let its powerful exponent, the newspaper, blame the president and board of directors if they have been niggardly in expenditure or have retained incompetent officials, let it inveigh against the manager or superintendent who has personally failed in his duty, but let it also include in its invective the employee, who, knowing his duty, has failed to perform it. The courts of the land should aid in this work. The violation of a train rule should be considered as an infraction of the law, and the offender should have to face a jury of his countrymen as well as a railroad court-martial when death and disaster can be traced to his neglect or misconduct.

In no way can the newspapers of this country do more

to increase the safety of railroad travel than by insisting that a violation of train rules should be punished by law.

There is yet another and higher view that we should all take of this question of railroad discipline, that which is based upon a sense of duty, of the faithful discharge of the obligations which we have voluntarily assumed, the view that what we have undertaken to do, what we are paid to do, we must do honestly, conscientiously, fearlessly; that view of duty which has been expressed by one of our great thinkers in four lines, with which I will conclude my address:

So nigh is grandeur to our dust,  
So near is God to man,  
When Duty whispers low, "Thou must,"  
The soul replies, "I can."

## COMMITTEE WORK OF THE ASSOCIATION : TRAIN RULES—CAR MILEAGE—SAFETY APPLIANCES.

(April 8, 1891, at Hotel Brunswick, New York.)

The remarks which I made at our last meeting were received with so much favor as to encourage me at this meeting to say something about the work presently before us. Much of this work is prepared by our Standing Committees, and it is their relation to the departments of railroad management referred to them respectively for consideration that I now propose to discuss.

The first in point of seniority is the Committee on the Standard Code of Train Rules, a committee to whose experience, zeal and ability we are indebted for that great work which has attracted the admiration of those competent to appreciate its value, and which has established the General Time Convention as an authority on this and kindred subjects.

When the Standard Code had been passed upon and adopted by the convention, the special committee to which its preparation had been entrusted was not dissolved, but was continued as a standing committee charged with the duty of modifying its provisions as use might disclose its defects, or as alterations might be required to keep it in accord with improvements in equipment or appliances. My own observation leads me to believe that some of its provision could be more readily understood if stated at greater length; and further, that there is a possibility for improvement in the rules for preventing rear collisions, a class of collisions which forms a large percentage of train accidents, and which occur more frequently with freight than with passenger trains.

Neither modern practice nor the Code recognizes more than two ways of preventing them—either the block



system or the flagman. In degree of efficiency these two ways are about as far apart as the poles of the earth. The one, the latest expression of human ingenuity as applied to railway practice; the other, a makeshift, the inefficiency of which is in proportion to the stupidity or indolence of the flagman with whom it leaves the protection of the train. The absolute block system is in principle an absolute safeguard against rear collisions, but the great cost of its construction and maintenance precludes its use on by far the larger part of the railroad mileage in this country.

In the absence of the block system the Standard Code relegates that extensive mileage to the watchfulness of the flagman, who of his own motion, without waiting for an order from the conductor, is required to leap from the rear of the moving train as soon as he can do so safely, and, armed with red lantern and torpedoes, to plunge boldly into the darkness of night, perhaps facing rain, snow or sleet, hastening with a stout heart toward the headlight of the following train which glares at him as he feels for his footing on the cross-ties upon some lofty bridge or long trestle; or at length he reaches the prescribed distance of twenty-six telegraph poles, or about one mile, plants his torpedoes and listens with eager ear for the signal of recall, and if through haste to depart, or inadvertence, or evil intent the signal is not given, and his train moves off without him, that flagman may pass the night in solitude, perhaps wet, cold and hungry, or until some train stops at his signal and picks him up. Such are the duties of a flagman, and it takes pluck and endurance to fulfill them.

It also takes intelligent judgment to determine promptly under the four rules, making sixty-eight lines of the Code, just when a flagman must go back, how far he must go, and what he must do when he gets there; yet, under the Code and as generally practiced, this important service is entrusted to a novice, to an apprentice in training for promotion as conductor, or to some sturdy brakeman, ac-

customed, it is true, to the hardships of train service, but to successfully avoiding them as well. Either through ignorance, or doubt, or fear of being left, the flagman may linger around the rear of the train until it is too late for him to stop a following train, or he may disappear in the darkness or just around a curve, near enough to be handy when recalled, taking the chances as to whether a train is following or not.

I admit that a compliance with the rules will protect the train, but that compliance rests upon the intelligence and devotion of the flagman himself. That he is often deficient in these qualities is proven by too many rear collisions, and the Code rules, and general practice as well, are both open to unfavorable criticism in depending for the successful performance of an important duty upon the intelligence and devotion of that man among the train crew who has the least experience.

We are familiar with the fact that rear collisions can be prevented by maintaining a certain interval of space or of time between trains. The interval of space is positively insured by the absolute block system. The interval of time is insured by detaining a following train at a station for a given time after the preceding train, but that interval of time is not insured for any given distance, as in that distance the preceding train may stop or slow down, and the prescribed interval of time be thereby reduced, and here the flagman intervenes to prevent collisions.

If the interval of space can only be preserved by the absolute block system, then until that system can be established and maintained at a cost commensurate with their income, many railroad companies must rely upon preserving the interval of time, and are accordingly interested in any modification of the Code rules which will better secure the preservation of that interval.

In my opinion, better security lies in relying less upon the intelligence and the devotion of the flagman. One

measure which I would suggest does not call for less intelligence, rather for more, but from another source, and that the engineer. He is generally the most intelligent and experienced man in the train crew; the best acquainted with the curves, grades, bridges, cuts, embankments and other physical characteristics of the road; the best informed as to the trains passed and to be met, and when a stop is made or the train slows down at an unusual place, he knows the cause and what the probable detention will be, not only after it occurs, but also before, and can often select the safest place for a stop. It is he, then, and not the flagman, who should determine when the rear of his train is to be protected, and the flagman should act promptly when the signal is given by him, but not before, except in emergencies that can readily be imagined. By inference the Code gives this authority to the conductor, and by remote implication to the engineer as well, who often avails himself of his privilege to signal the flagman to the rear when in his judgment it is necessary, but primarily the burden is put upon the flagman himself to determine when he shall go back. I think that if the burden was plainly put upon the engineer to determine and upon the flagman to act, his action would be controlled by the most intelligent and best informed man in the crew. But even with this modification of the Code rules the interval of time would not be securely preserved. To secure this I recommend that the Code shall give a more extended recognition to the use of the fusee, which at present is only permissive as part of the equipment of the flagman. How much more valuable in the hands of the engineer! Whenever he is about to stop or to slow down his train at an unusual place, require him to drop a lighted ten-minute fusee by the side of the track one mile before the stop is made, and the interval of time between that train and one following is positively secured by a sentinel that will not desert its post, by a signal whose unmistakable light will illumine its surroundings, let the

wind blow and the rain fall as they may. I am not speaking hypothetically but from experience, and my satisfaction with the fusee used in this way is shared by our officials and employees. Its use does not do away with the protection afforded by the flagman, but rather increases it, for as he crosses a bridge on his way to the rear he feels himself secure against the approaching train so long as he sees that purple light blazing between.

If my views are correct there can be found, at a reasonable cost, a better method of protecting the rear of a train than that prescribed by the Code, one available by day as well as by night, for, even then, the smoke from the lighted fusee will attract the attention of the following engineer.

The Committee on Car Mileage, originally a special committee, has, from the force of circumstances, become one of our standing committee. Its delay in attaining results is an evidence of the magnitude of its task and of the difficulties which it has encountered. The objects which it has in view are a more equitable compensation for the use of cars and greater average mileage, and, of the two, the latter is of more importance to the stockholders who own the cars and to those who use them. Consider that there are about one million freight cars in use, and assume that the average daily mileage of each is about twenty-five miles. If that average can be increased by five miles, that means an increase of one-fifth of the total mileage, which is virtually adding one-fifth to the number of cars in use, or 200,000 cars, representing, at \$500 a car, a capital of \$100,000,000, and with an average daily load of six tons, an additional capacity of 1,200,000 tons per day, and it was with these possibilities in my mind that I said that a greater average mileage is of more importance than equitable compensation for the use of cars.

For such compensation to be equitable it should be based upon two factors, wear and use, as is the case with

the so-called mixed system, in which the charge for mileage represents the wear, and the per diem charge represents the use. The tendency is strongly toward the adoption of this system, and, indeed, the opposition to it is mainly as to details, partly as to the possibly increased cost of obtaining the information necessary to proper accounting and partly a fear that the change from the straight mileage system may result in increased expense to those companies whose own equipment is not sufficient for their business. But it would seem that the cost of the mixed system ought not to stand in the way of its adoption if that will increase the average mileage, and any increase in the rental balances of debtor roads can be avoided by such an adjustment of the two factors of mileage and per diem charges as will leave the resulting sum about as at present. If this is to be the result; if the debtor companies are to pay and the creditor companies to receive the same as at present, then the advocates of the mixed system can only defend it by the assertion that its adoption will lead to a greater average mileage, and their efforts should be directed to sustaining that assertion by facts. It might simplify the problem and hasten its solution if the rental of coal cars and of some other special classes continued to be adjusted as at present.

There is another consideration which has intruded into our discussions of this matter, and that is, the different effect of the one or the other system of rental upon competitive traffic, which is probably due to a confusion of the terms demurrage and per diem charge. Demurrage is paid by the consignee to the delivering road, and includes not only a charge for the unnecessary detention of the car, but also for the track space thus occupied, as well as for the additional switching and insurance risk.

The per diem charge is paid by one company to another for the use of its car, and it is right that such use should

be paid for, even though the former chooses to give that use as a gratuity to its customer.

We have yet a third standing committee, that on Safety Appliances, which has been constituted so recently as to have had but little opportunity to show results. Its field is as extensive as it is important, and the public, as well as our own members, will await its conclusions with interested expectation. Those conclusions will not be of a technical, but of a practical character. The committee will not delve into the records of the Patent Office, nor will it require a laboratory or a test yard. These matters will be left to the several technical associations and to the restless ingenuity of the American inventor. It is for that committee to determine—first, that there exists in some department of railroad operations a necessity for means of safety additional to those in general use, a necessity so extensive or so urgent as to call for united action on the part of our members; next, to ascertain what appliances there are which they consider as suited to meet that necessity; or, if such appliances do not exist, then to state what the requirements are, and to recommend that they be brought to the attention of the technical associations, which are organized and equipped for the proper investigation of such matters.

The principal aid which the General Time Convention can give to the introduction of meritorious safety appliances is to provide for their simultaneous adoption by our members. This will hasten the general use of automatic couplers and continuous brakes on freight trains, of improved methods of lighting and heating passenger trains, and of all devices that must be made interchangeable in order to be applied in through train service over connecting roads, and here is the field for the Committee on Safety Appliances. In this field it will collect and publish statistical information that will be of value because obtained at first hand and from authoritative sources. In obtaining this information the committee should have the

prompt and cordial support of our members; its circulars should have immediate and careful attention in order that its reports may neither be unnecessarily delayed nor based upon scanty or erroneous data.

As I stated in my opening remarks, the matter which serves for our semi-annual meetings is the result of the assiduous and unselfish labor of these committees, and to them is due the gradual transformation of the General Time Convention from a schedule making body to an association of the railroad companies of this country, organized for mutual benefit in the development and solution of problems connected with railroad management.

## COST OF TRANSPORTATION.

(October 14, 1891, at Hotel Brunswick, New York.)

Since this body developed from a time-table meeting into an association for the consideration of matters pertaining to the operation and management of railroads, the subjects before it have been in keeping with the official position and professional reputation of those who have taken part in its deliberations. Yet not one of these subjects is of such importance to the members of this Association as that to which I shall call your attention to-day.

The end and aim of a railroad is Transportation. While Transportation is its function, by Transportation it must exist. It must be fed from its own products, and the charges for its services must be made with this in view. Whoever pays a freight bill or buys a passage ticket, contributes to the fund from which employees' wages and bills for supplies are paid, as well as interest coupons and stock dividends. That is to say, the charge for the service is composed of two elements—the cost and the profit; and the cost must come first. Stockholders may go without dividends and bondholders without interest, but unless the men get their wages they will not work, and supply men will not part with their goods without pay for them. The substance of this statement is that for a railroad to fulfill its purpose, the freight and passenger tariffs, as a whole, must produce a fund sufficient for the cost of operation, and if the fund be insufficient the service will be unsatisfactory.

Here we are brought face to face with the problem of making railroad tariffs, a problem about which there has been much making of speeches and writing of books by all manner of men; railroad experts, politicians and po-



litical economists. We hear much of the average rate per ton per mile and per passenger per mile, as also of the cost of transportation per ton mile and per passenger mile, all of which may have more or less value as information, though it would be difficult to point out its use in the practical operation of a railroad. It is well for the farmer to know the average price per bushel of grain and the cost per bushel for its production; for the iron master to know the average price and cost of production of a ton of pig-iron, or for the manufacturer to know the average price and cost of production of a yard of cloth. The bushel of wheat, the ton of iron, the yard of cloth are units of trade by which the prices of these commodities are fixed, but the ton mile and the passenger mile are statistical abstractions and not the units by which the price of transportation is fixed. How easy it would be to make a tariff if all articles were transported at a uniform rate per ton per mile, and if all passengers were carried at a uniform rate per individual per mile. But the tariffs in actual use are made up of separate rates on different articles, or on different classes of passengers, for transportation between many places for varying distances. The local passage rate per mile is lost sight of when competition or commutation or excursions are to be considered, and the rate per ton mile is the last thing thought of in making freight tariffs.

I do not intend to discuss the making of rates at any greater length. My purpose in calling your attention to the fallacies involved in the average rate and cost per ton mile and per passenger mile will be evident as I proceed, and you will pardon me for repeating, that while the cost of transportation must come out of the charge for transportation, that charge is not a uniform rate per ton mile and per passenger mile.

What is the cost of transportation? How is it to be ascertained? What is the correct definition of the term, cost of transportation?

These are indeed questions of greater importance to

the members of this association than any which have yet been before it. They lie at the bottom of most of the differences and dissensions which have arisen between railroad corporations and the communities which railroad transportation has created. The most ignorant charlatan, the most rabid demagogue, will speak you fair on this point. They do not object to paying reasonable rates. But what goes to make up reasonable rates? Here come in the conditions of long and short haul, of competitive and local traffic, of ascending and descending grades, of cheap or costly fuel and wages, and others equally familiar to those whose work-day lives are spent in their consideration. And considered they must be in discussing the cost of transportation.

Let us begin by defining what we mean by the cost of transportation. Do we mean the cost of operation? If we do, then we must include the cost of administration, of maintenance, repairs, and renewals generally, as well as the proper cost of transportation. If this be not our meaning, if we mean only the cost of moving freight and passengers, then we must still ascertain the other items which make up the cost of operation. We must ascertain them in order to exclude them, and, by eliminating them from the total expense account, arrive at the cost of transportation apart from the other classes of expenditure.

What are these classes? We will classify them as they relate more or less specifically to the movement of freight or passengers, beginning with those the most remote from that service, as, for instance—

Class A.—Expenses not affected by amount of traffic.

Class B.—Expenses indirectly affected by amount of traffic.

Class C.—Expenses affected by train mileage.

Class D.—Expenses affected by car mileage.

Class E.—Expenses affected by amount of freight loaded or unloaded.

On this basis all items of expense of operation can readily be assigned to their proper classes.

In class A would come the cost of administration, as the salaries and office expenses of the general officers, and all other expenses substantially unaffected by the increase or decrease of traffic.

In class B would be included those expenses which are indirectly affected by the fluctuation of traffic, as, for instance, certain expenditures in the roadway department.

In class C would appear all expenses directly affected by train mileage, such as trainmen's wages and expenses incurred in the maintenance of locomotives.

In class D would appear all expenses directly affected by car mileage, by the maintenance of cars, etc.

In such a division it will be found necessary to make yet another class, which I shall call class E, to include expenses directly connected with the loading and unloading of freight.

I shall not refer in greater detail to the distribution among these several classes of the expenses which enter into the operation of a railroad. In actual practice I did this fifteen years ago with great minuteness, and have continued to observe the same distribution of accounts. It has been found invaluable in the discussion of all questions in which an analysis of the cost of operation is desirable. This collection of statistics recorded for fifteen years in such a form as I have here described has afforded the means for a critical comparison of the effects of improved methods upon the cost of operation, for in those fifteen years this particular property has been brought from a very inferior condition into average conformity with modern practice.

This classification of expenditures was devised with a definite end in view, viz.: to ascertain whether we received less from competitive business than it cost us to perform the service.

For this purpose, of what value is it to multiply the

weight of each shipment made during the year by the number of miles transported, to sum up the results of these calculations into ton miles, to divide by this sum the total annual expenditures and obtain a quotient that we call the average cost per ton mile? Is this figure of six or seven mills, or whatever it is, the test which managers are to apply to rates on competitive traffic? Are they to withdraw from competition when the rate falls below this average for fear of doing business at a loss? Evidently not, for this figure is but the average of a large number of transactions, many of which were done at a much lower rate.

Yet this is just what it would be valuable to us all to know. When shall we draw out of competition for certain business, because it would be a loss to carry it? And this is the information which I have sought to obtain.

Confining myself for the present to freight traffic, I will ask you to bear in mind that each transaction should be considered by itself, that is, will it pay us to take this article or that at a certain rate from such a place to such a place? One condition is that of quantity. Is it a single package, a car load, a train load, or many train loads?

Another condition is that of direction. Is the movement in the direction in which the greater tonnage moves or in the opposite direction? This determines whether cars returning empty can be used for the purpose.

I take this then as the simplest form in which the problem can be presented. If you have an empty car at Buffalo, we will say, coming to New York, what will it cost you to bring a barrel of flour in that car? It will cost you the labor of handling that barrel, of billing it and the insurance of the common carrier's risk, and no more. If a car load be moved under the same conditions the items of cost are the same increased with respect to labor and insurance. If your road were an intermediate link in a through line, you would not even have incurred the cost of billing and handling. But if the shipment be a train

load, there is another condition to be observed, for your engine will not pull as many loaded as empty cars, and your locomotive mileage is accordingly increased. From this reasoning it appears that rather than lose the carriage of a single barrel or of a car load of flour in a car that would otherwise be moved as an empty it would pay you to take it at any price above the cost of handling, billing and insurance, but if the shipment amounts to a train load, then the locomotive mileage becomes an additional element of cost. The conditions change when competitive business is offered in the direction of greatest tonnage, for here the carriage calls for additional car mileage and brings in all the items of cost directly affected by car mileage.

It is unnecessary for me to proceed farther on this line of argument to show that the first requisite for an intelligent understanding of these questions is a knowledge of the cost of car service and of train service.

This is what you want to know, and not the average cost per ton mile. This is just the kind of information that we have been gathering up on the road to which I have already referred, and it is interesting to note how these items of cost have been affected by the gradual introduction of engines and cars of greater capacity, by the variation in wages, by the development of telegraph and station service and by other changes in our ways of operation.

Stating the whole matter briefly and in a general way, railroads are not built solely for competitive business—that is, to take away the business which another road is doing. They are usually projected with the idea of developing the country through which they are to be built, of creating business by furnishing transportation facilities without which such business could not exist, of enabling grain to be grown on the western prairies, or coal and ore to be mined in the mountain ranges, or the trees of the forest to be converted into lumber. These

are the purposes for which they are projected, and that they fulfill them is shown by the great anxiety to get a railroad built into a country, by the hearty welcome with which the first train is greeted, by the advance in value of the lands and town sites, etc. It follows that those who are the beneficiaries of this investment should at least pay for the cost of operation and maintenance, as they would have to do if the property were their own. This includes the cost of administration and all other expenses, as well as those directly affected by train service or what may be specifically called the cost of transportation. With reference to any particular road, this applies only to such traffic as is solely dependent upon it, for if a certain locality or class of traffic has a choice between two or more railroads, opportunity is afforded for competition. The distinction in this respect between what is known as the local and as the competitive or through business is that the local business of any railroad must pay sufficient toll in the way of passenger and freight rates to maintain that road, or be deprived of the necessary facilities which it affords, while the competitive business, not being dependent on it, may be diverted, as interest or other motive may direct.

Here it is that the importance arises of knowing what it costs to transport any specific shipment—a knowledge important to the local shipper as well as to the railroad manager, for if the railroad company loses the profit on competitive business, the loss must be made good from the local traffic, at least to the extent necessary to the efficient maintenance of the property. If the farmer, the miner, the lumberman, the manufacturer solely dependent upon one railroad could be brought to understand that the competitive business is paying part of the expenses which they and those similarly situated would have to pay altogether, if that business were lost to the road, they would cease to discourse of the long and the short haul and of the average rate per ton mile; they would only en-

quire as to the contribution which that competitive traffic was making toward supporting the road constructed for their benefit, and they would regret to see any such business lost to it. The converse of this proposition is that they are equally interested in seeing that this competitive business is not conducted at a loss, for if it be, then the tolls on the local business must be increased to make such loss good. It has seemed to me that the only sound reason for the regulation of railroad rates by law is thereby to protect those who cannot protect themselves, and this is a case in point. The local shipper ought to be protected against contributing to pay losses on competitive business, because he is in no position to make rates for himself, as the competitive shipper is. And this is another reason for knowing definitely when such a contribution is really made, that is, for knowing the actual cost of performing any specific service. With this idea clearly understood, the freight agent could make competitive rates intelligently upon being told the cost of car and train service under varying conditions. The injunction to "Get Business" would then be modified to get business so long as there is a profit, and the traffic and transportation departments would be brought into accord.

Let us return to the question which I asked some minutes ago. What is the cost of transportation? As I have now developed my subject, the cost of transportation pure and simple, is made up of three elements—the cost of train service, of car service, and of handling the articles shipped or passengers moved. The test to be applied on this basis to any statement as to the cost of transportation, with reference to any particular transaction, is whether that statement includes any item which would not have been required if that particular service had not been performed. If it does, then the statement is fallacious, misleading, untrue and without practical value to the railroad superintendent or traffic manager. This is the objection to the ton-mile basis. It is of no practical

value to these officials in the conduct of their business, for it includes irrelevant items ; but when they learn what it costs their company to bill and handle freight per ton, to run a train per mile and to move a car per mile, they have just the information required to know how low they can make rates for competitive business without paying for the privilege. This ignores all other items of expense incurred in the operation and management of the road, the cost of maintenance of the track, bridges and buildings, of salaries and office expenses of general officers and of similar items. So it should so far as competitive business is concerned, for as a general proposition, these expenses must be incurred whether any particular competitive shipment is made or not.

But if the competitive traffic is not to be charged with these items of expense, from what source are they to be paid ? I say primarily from the revenue from local business, assisted, as may be, by the profit on competitive business; or, to put it differently, to the actual cost of transportation there should be added in making local tariffs an amount sufficient to provide for the expenses indirectly incurred in performing the service; somewhat as in fixing premiums on life insurance, the actuary of an insurance company adds to the assumed rate of mortality a so-called "loading," to include the cost of management and of other corporate expenses. This is what can be done on a railroad by such a classification of expenses as I have suggested and which I will now repeat, viz. :

Class A.—Expenses not affected by the service performed.

Class B.—Expenses indirectly affected by such service.

Class C.—Expenses affected by train mileage.

Class D.—Expenses affected by car mileage.

Class E.—Expenses affected by handling freight.

In making rates on competitive traffic the last three classes of expenditure should alone be considered. In making rates on local traffic the first two classes should



also be considered. But it will be said that railroad companies incur large expenditures to handle competitive traffic which under this system of classification would be included in class B. This is true, as for instance in the establishment of extensive stock yards for competitive cattle traffic, or of elevators for grain traffic, or of coal pockets for coal traffic, but these cases are the more readily provided for by reason of this classification, for if such expenditures are not met as is generally done, by specific terminal charges, they should be added as a "loading" to the particular class of competitive traffic as a whole, and would appear as an invariable quantity in the sum total of the competitive rate on cattle or grain or coal, and would not be a charge on the local traffic at all. So it will be seen that such a classification of expenditures is capable of application to varying circumstances with a facility and precision not to be hoped for from the ton-mile unit of cost.

There is another view that I would present of this plan of classification with reference to the aid which it gives to the intelligent practice of economical methods; for, with such a division of expenditures, any increase or decrease in the gross amount expended for any particular purpose appears just where it belongs.

Defective wheels, axles and couplers add to the cost of car mileage, or class D.

Increased wages of trainmen appear in the train mileage, or class C.

Additional clerk hire or labor in handling freight affects class E; and items affecting the other classes appear accordingly.

By this plan any extravagances or economies are shown up in a practical way as a guide or a warning for the future.

The analysis of expenditures so classified serves to show how expenses incurred for the greater comfort or convenience of the public may affect the cost of train or car

service, and how an increase in the wages of trainmen and yardmen increases the cost of train service which must be made good entirely from local traffic if competition, as for grain or other western products, is unbridled and unrestricted.

I have so far said but little about passenger service, mainly, because with most of us the freight business is more important, but there are some points in connection with the former on which I will touch before I conclude. I would wish you to note the absurdity of considering the passenger mile as equivalent to the ton mile, an assumption common to railroad statisticians, and for which it would be difficult to give a sensible reason. Even if a passenger weighed a ton, the character of the service performed in transporting him one mile as compared with carrying a ton of freight that distance is so different as to make the assumption of equality of the two units to border on the ridiculous. They are so dissimilar that I have kept distinct the items making up the cost of train and car mileage in passenger and in freight service. This is quite another matter from the arbitrary division of all expenses between the passenger and freight traffic, as insisted upon by the Government statisticians, for there are many items included in my classes A and B which bear no relation whatever to the distinctive character of the traffic. That they should be considered in making passenger rates as well as freight rates is true, but, by keeping them separate from the actual cost of each service, their amount is known as well as the proportion which they bear to the actual cost of transportation, which is impracticable by the other method. We have also to consider that in class E, or the cost of handling freight, we have an entire class of expenses which has nothing to do with the cost of carrying a passenger. Indeed the passenger handles himself, and the only items bearing directly upon the transportation of a single pas-

senger are the cost of printing his ticket, and perhaps of handling his baggage, if he has any.

In some respects the cost of passenger service differs materially from that of freight service. The trains are generally made up of a fixed number of cars and run at stated intervals without regard to the number of passengers. The entrance of a single additional passenger in a train adds nothing to the cost of moving that train, and the cost of transporting a single passenger is therefore inappreciable. What is to be desired is to get the greatest revenue from the train per passenger car, and it might be more profitable to secure well filled trains loaded to the engine's capacity than to insist on a uniform rate per passenger mile which did not half fill the train. The unit of cost per passenger mile is as fallacious and valueless as the unit per ton mile. A passenger does not measure his desire to get to a place by the number of miles that he must travel to reach it, and whether he goes fifty or sixty miles, it costs the same to carry him if the train be scheduled for the longer distance and there be room for him.

This idea of rate for distance does not prevail in making freight rates. What the freight agent wants is loaded cars, and that is what should be sought by the passenger agent, who is himself interested in knowing what it costs to move a passenger train and a passenger car when he is getting up excursion parties or meeting cut rates on business from a distance.

The practical value of the units of cost which I have recommended may be briefly illustrated by assuming that the cost of freight train mileage is 20 cents per mile, of freight car mileage, 2 cents per mile, and of handling freight, 10 cents per ton.

If twenty tons of competitive freight were offered to be moved in cars returning empty, the actual cost of transportation would be ten cents per ton for handling, or two dollars for the shipment. If a larger lot were offered

and the train of cars returning empty were thereby reduced one-third, the cost would be increased by the additional train mileage thus rendered necessary. But taking an example of a train load, say thirty cars of twenty tons capacity, offered in the direction of greatest tonnage, say for a distance of two hundred miles, the actual cost of transportation would be made up as follows :

|   |                |
|---|----------------|
| Handling 600 tons of freight at 10 cents per ton..                  | \$60 00        |
| Car mileage, 30 cars 200 miles, 6,000 car miles, at<br>2 cents..... | 120 00         |
| Train mileage, 200 miles, at 20 cents.....                          | 40 00          |
| Total .....   | <hr/> \$220 00 |

which amounts to \$7.33 $\frac{1}{3}$  per car load or 36 $\frac{2}{3}$  cents per ton, and on this basis any rate that could be got over these figures would be a profit to the railroad company and a diminution of the burden on the local shippers. How valuable would such information be to the soliciting agent ! You could then trust him to use his talents to get as much higher a rate as possible, feeling protected at least against doing the business at a loss.

On the other hand, assume the average cost of one-half cent per ton-mile as applied to this case and you would have a cost of \$1.00 per ton or \$20.00 per car load to consider in competing for this shipment in place of the actual cost of \$7.33 $\frac{1}{3}$  per car or 36 $\frac{2}{3}$  cents per ton. Who ever heard of a soliciting agent being called to account for making rates on competitive business below the average cost per ton-mile as figured by the statisticians ?

I may be asked, do you mean to assert that freight can be carried at the rate of \$7.33 $\frac{1}{3}$  per car load for 200 miles without loss ?

My reply is that I am not speaking of the entire traffic of a road, but of ascertaining for a specific transaction the lowest rate at which the service can be performed without actual loss to the railroad company. As I have already

said, any loss in competitive business must be made good out of local revenue, and it is therefore to the interest of local shippers to sustain the efforts of railroad managers to maintain rates on competitive business by any fair means; this would include the legal recognition of agreements for pooling revenue from such business under proper regulations.

I have not attempted within the limits proper to this address to cover all the field for discussion which I have brought to view, nor to meet all the objections that may be offered to what I have advanced, but I have sought to impress upon you the absurdities of the ton mile and the passenger mile basis of rates, and the injustice to railroad managers of using such a basis for measuring their operations and for criticising their management.

I have further sought to show how the more rational basis which I have described may be made available for practicable use in the traffic department, and how it may serve as a common foundation on which law makers and railroad experts may build an enduring system of regulations in which long and short haul, just and unjust discrimination, through and local rates may all find an appropriate place.

## SAFETY APPLIANCES—CAR COUPLERS.

(April 13, 1892, at Hotel Brunswick, New York.)

The public interest which has been aroused on the subject induces me to address you to-day on compulsory legislation about safety appliances, particularly with reference to freight car couplers.

The cause of this interest it is not difficult to trace. Newspaper accounts of yardmen and brakemen injured in coupling cars were emphasized by statistics embodied in the official reports of railroad commissions.

Attention being thus drawn to this hazardous feature of railroad service, the opportunity was afforded for sensational appeals to the ever-ready sympathy of mankind for those who, fathers, brothers and husbands like themselves, were stricken down in the fulness of manly vigor and in the discharge of their daily duties. As is commonly the case when our feelings are aroused, there was a disposition to lose sight of the necessarily dangerous character of the occupation of these unfortunates, and of the tendency to indifference, carelessness, and even recklessness which seems to be inseparable from familiarity with such dangers and from dexterity in avoiding them.

The usual desire under such circumstances for a scapegoat was, without inquiry and without reason, focussed upon the inanimate corporations without souls, and their animate representatives and managers, popularly supposed to be equally soulless. The asserted greed of the one and indifference of the other were held forth as sufficient grounds for the belief that they could make it impossible for men to be injured in coupling if they would.

This belief, intensified in various ways and from different motives, has led not only to State legislation but to the

elevation of the question to national importance, by recommendations contained in the President's messages to Congress and by demands on that body for compulsory legislation.

This, then, is the foundation on which compulsory legislation is demanded: that, in coupling cars, railroad employees are exposed to dangers from which their employers can protect them but will not. As it was recently stated in a leading daily of this city: "There is no good reason to believe that the railroads will soon provide an adequate remedy of their own volition."

The correctness of this statement I propose to test by a brief reference to the history of the coupler question, as on this ground alone is compulsory legislation justifiable.

The Master Car Builders' Association, composed of railroad officials in charge of the maintenance of freight and passenger cars, was organized in 1866, and the first notice that I have found of any interest in this subject on the part of any public officials, either State or corporate, is in the proceedings of their Third Annual Convention in 1889.

At that Convention Mr. F. D. Adams, now and for many years past on the Boston & Albany R. R., used the following language: "Many of our men employed in coupling trains are injured and lives lost because drawheads do not come into line, one being high and another low, thus driving by and crushing the man that is in the performance of his duty, or maiming him, frequently for life.

"It is a duty we owe to the companies that we represent, and a duty that we owe to our fellow-men, who are necessarily placed in positions that endanger them, to adopt some height that will be uniform."

You will see from this reference that the attention of railroad officials was first called to the varying heights of drawheads and couplers as the cause of danger and of injury to railroad employees.

At the next Annual Meeting Mr. Adams was elected President and a committee appointed to report on a uniform height for passenger car platforms. At the meeting in 1871 this height was fixed at 33 inches for all cars, passenger and freight.

At the seventh annual meeting, in 1873, Mr. M. N. Forney, a gentleman well known to us all, "called the attention of the Convention to the great number of accidents and loss of life occurring from the present method of coupling cars," and "thought the Convention should take some action in the matter, with the view of remedying the evil so far as it could be done. He would, therefore, move that a committee be appointed to report at the next meeting." Accordingly a committee was appointed "on best device to prevent accidents while coupling cars." This committee reported at the meeting in 1874 that it had sent out a circular to the railroad companies, and that "the general opinion as expressed in the replies received is to the effect that the variations in the height of drawbars is one of the most fruitful sources of accidents. So long as persisted in we do not think that any self-coupling drawbar can have the benefit of a fair and impartial trial. Many of our leading roads have given quite a number of self-couplers a trial, but, judging from their remarks as to how they answered the purpose for which they were intended, it would seem that they generally had failed."

At the same meeting the Standing Committee on Drawbars and Buffers, of which Mr. F. D. Adams was Chairman, reported "that a great advantage would be derived from a uniform drawbar, such as would be accepted as a standard and which should also be a self-coupler; but we are not prepared to say that any has as yet been invented that is worthy of such acceptance."

This report, made in 1874, seems to be the earliest official recognition of the value of the so-called automatic coupler, now so familiar to us, and it will be seen that the general use of couplers of a uniform height was looked



upon as a condition which must necessarily precede the adoption of a standard coupler, for the self-coupling principle to be made available. From this time we find the Association earnestly working to this end, and the success which it ultimately attained in establishing a uniform height really made it possible to use automatic couplers at all.

At the ninth annual meeting, in 1875, the same Standing Committee reported that it had "examined a great variety of new models and plans which are claimed by their inventors to be improvements, but have seen nothing that meets the demand. The drawbar should be a self-coupler avoiding the use of links and pins." This is the first appearance of a principle now well established in our minds. The report further shows that the committee were actively engaged in the search for a suitable standard coupler. The motive which actuated them was well expressed, by Mr. Hopkins of the New York & New Jersey R. R.: "This Association is in duty bound to furnish some device that shall save the great number of lives annually sacrificed by the coupling of cars."

At the eleventh annual meeting, in 1877, Mr. Kirby, of the Lake Shore & Michigan Southern R. R., said that his company intended to equip one hundred cars with self-couplers.

The President, Mr. Garey, of the New York Central & Hudson River R. R., stated that he had been waited on by a committee of yardmasters. They said: "We don't care anything about self-couplers, but only give us something, so that we can be sure that we won't be crushed in getting between the cars. Give us deadwoods right over the drawbar." Mr. Adams said: "I firmly believe we are in duty bound, as an Association, to listen to the appeals of these men."

This appeal from the yardmasters turned the attention of the Association to the proper dimensions and location of deadwoods, notwithstanding the assertion of Mr. Suth-

erland, of the Canada Southern R. R., that "few railroad companies would be satisfied with anything short of an improvement that would entirely dispense with links and pins, so that the men can keep entirely from between the cars."

I call your attention particularly to this remark, as the first official enunciation of the fact, simple as it is, which should never be lost sight of in the discussion of the coupler question from a humanitarian standpoint.

At the twelfth annual meeting, in 1878, a committee was appointed "to investigate the causes of accidents to trainmen and report what means can be provided to protect train and yardmen from injury while in the performance of their duties," and the Yardmasters' Association was invited to communicate with the committee.

At this meeting Mr. Griffiths, in reporting on self-couplers, stated a fact with which we subsequently became very familiar, that there were so many of them "and when they come together they don't operate."

At the thirteenth meeting, in 1879, President Garey referred in his address to this subject as deserving special attention, and the committee reported, as the result of one hundred inquiries, that the yardmasters considered the variation in height of drawbars and the deadwoods on each side of them as common causes of injury.

At the fifteenth meeting, in 1881, President Garey in his address again called attention to this subject, saying: "The present defective and expensive devices for coupling freight cars have been in use for many years without any marked improvement upon the old link and pin system; none have sufficient advantages to place them in general use. The necessity for improvement in this direction is of so much importance that our legislators have been called upon to investigate the matter. Wherever it has been shown that railroad companies could better protect the lives of passengers or employees by the use of practical improvements there has been no necessity for legislative

or any other pressure, other than the plain facts, to place such improvements in use."

It appears from this that in 1881, eleven years ago, the matter had begun to attract the attention of legislators, taking the usual form of a proposed investigation, and that President Garey, in noting this new phase of the question, disposed of it in fitting language. Again, in 1882, he said: "If an automatic coupler, or one sufficiently so to prevent the necessity of trainmen standing between cars while in the act of coupling, could be put in general use, with a simple and efficient trainbrake under the control of the engineer, and arranged so that it could be applied from any part of the train, they would remove many of the sources of accidents to men while handling cars."

At the same meeting the Committee on Causes of Accidents to Train and Yardmen reported that they "had not as yet seen an automatic coupler that they would feel justified in recommending to the Association."

At this point let us stop in our researches into what the railroads had been doing towards the adoption of a safety coupler and see what action had been taken officially by railroad commissions and by legislation.

On March 19, 1880, eleven years after the matter had first been brought to the attention of the Master Car Builders' Association, the Massachusetts Legislature instructed the Board of Railroad Commissioners to investigate and report upon the subject of freight drawbars and couplers. Before referring to that report let us re-state briefly what the railroad companies had done.

At the third meeting of the Association, in 1869, Mr. Adams had recommended the adoption of a uniform height of coupler as a protection to the lives of railroad employees. At the next meeting a committee was appointed to report upon it, and in 1871 a standard height was adopted. Thus was the first step taken in the evolution of the safety coupler by the railroad companies themselves and at the instance of a railroad official. At the meeting

in 1873 a committee reported upon the desirability of adopting a standard self-coupler, if one could be found worthy of acceptance. In 1875 the same committee, after examining a great number of models, could find nothing that would meet the demand, and declared that the standard self-coupler should avoid the use of links and pins. In 1877 we find the Lake Shore & Michigan Southern R. R. Co. experimenting with safety couplers on a hundred cars, and in the same year a committee of yardmasters declaring to the President of the Master Car Builders' Association that they did not care anything about self-couplers, that they wanted something to prevent them from being crushed between the cars—and accordingly the attention of the Association was directed for some years from self-couplers to deadwoods, apparently in response to suggestions from the yardmen—for, as Mr. Adams said, the Association felt in duty bound to listen to the appeals of these men. In 1878 the Association extended an invitation to the Yardmasters' Association to act in concert with their committee, which was to report upon the means for protecting train and yardmen from injury while in the performance of their duties, and at that very meeting the attention of the Association was called to the importance of having the several patterns of self-couplers to be so designed as to couple interchangeably. In 1881 the President of the Association asserted that none of these new inventions had sufficient advantages to place them in general use.

This, then, was the advance made in the search for a self-coupler at the time that the Massachusetts Legislature called upon the Board of Railroad Commissioners to investigate the subject. Does this statement of facts bear out the charge made against the railroad companies that "There is no good reason to believe that the railroads will soon provide an adequate remedy of their own volition"? For eleven years they had been earnestly seeking for an adequate remedy. They had made a stand-

ard height for couplers, that the safety coupler might be made available. They had laid down the principle that all safety couplers must be without links and pins and couple interchangeably, and had been experimenting with the couplers presented to them for trial without being able to endorse any of them. What more could the railroad companies have done? What more had anyone else done during these eleven years up to the time that the Massachusetts Legislature called for a report from their Board of Railroad Commissioners? And what did the Commissioners report? They said that they could not report satisfactorily on models, or even on trial tests—that the only valuable test was “by continued use in the actual course of traffic.” They said that they would prefer to be guided by the action of railroad corporations; that “when fifty or more of such corporations adopt an automatic coupler, not as an experiment but as a standard, they do so in spite of the increased cost and trouble, and in spite of the natural prejudice against any new device. When, having tried such a device for a long time as an experiment, railroad managers ord<sup>1</sup> its universal use upon their roads, they give the strongest testimony possible in its favor. In justice to railroad managers, it ought to be added that their backwardness in this matter is partly owing to the fact that, in the belief of many, no perfect device for self-coupling has yet been found, and still more that, in their opinion, most of the accidents are owing to the recklessness of brakemen and might be easily avoided. They cite instances where wooden and iron rods have been provided to avoid the necessity of going between freight cars, and where brakemen have declined to use them and have looked upon their use as cowardice. There is much truth in these statements”; and, after saying this, the report recommended a bill requiring the use of the Safford drawbar “or some other automatic coupler.” In 1882 the Connecticut Commissioners recommended that the Legislature should require new cars to be equipped with automatic couplers. In 1883 the Massachusetts

Commissioners hoped that the Master Car Builders' Convention would agree on some standard freight car coupler. In 1884 the Massachusetts Legislature passed an Act requiring that freight cars thereafter constructed or purchased, or when a coupler was repaired, there should be placed on them "such form or forms of automatic or other safety couplers as the Board of Railroad Commissioners may prescribe after examination and test of the same, to take full effect on March 1st, 1885." On September 25th, 1884, the Board of Commissioners undertook to solve the problem. Just before that date, the Committee on Automatic Freight Car Couplers had reported to the Master Car Builders' Association advising that a committee of experts be appointed to be present at any trial of couplers, and noted as worthy of special mention certain drawbars, as follows: Archer's, Cowell's, United States, Janney's, Ames', Mitchell's, Wilson & Walker's, and the Conway Ball Coupler. In the discussion that followed Mr. Wilder, of the New York, Lake Erie & Western R. R., said: "If the railroads of this country saw fit in their freight carservice to apply the Janney Coupler, the same as on the passenger cars, to all their freight cars, or the Miller hook, it would probably be a good thing to do." Mr. Wall, of the Pittsburg, Cincinnati & St. Louis R. R., said: "In order to bring this matter to an issue before this meeting, I would like to submit a motion that it is the sense of this Convention that any automatic coupler presented here should couple in a vertical plane." After a long discussion, the meeting adopted the following resolution: "That the Executive Committee be instructed to issue a circular to all the railroad companies represented in this Association, setting forth our plan of retaining Mr. M. N. Forney to devise, conduct and record tests of automatic freight car couplers, and asking them to signify their willingness to sustain their pro-rata proportion of all expenses incident to such tests."

With this action of the Master Car Builders' Association before them, the Massachusetts Commissioners undertook,

as I have said, to solve the car coupler problem themselves. They announced that they would "not order the use of any coupler which had not been tested in actual traffic; and this rule was founded on the well-known fact that no expert, however able, can judge of the actual working of a device merely from the inspection of a model, and the man who announces that he can confidently pronounce upon the value of such a railroad invention without actual tests, contradicts all experience and shows himself unfit to be heard upon the question. It is impossible to foretell the safe working of any such device until it has been tried, and it would be a scandal to 'prescribe' the use of any coupler whose safety has not been shown by actual test."

Notwithstanding the views announced by the Commission, they did "prescribe" five different couplers that would not couple with each other. The railroad companies in the State were notified that by March 1st, 1885, all new cars and all cars upon which new couplers were put should be provided with some form of the couplers so prescribed. Yet, in July, 1888, this Commission reported that only 5,000 of those "prescribed" couplers had been so applied.

Let us now return to the proceedings of the Master Car Builders' Association. The Executive Committee provided for a public trial of automatic freight car couplers at Buffalo, on Sept. 15th, 1885. Forty-two were subjected to the required tests, and from this number twelve were recommended for further trial in actual service.

In July, 1886, and in May, 1887, the Association undertook a series of competitive tests of power brakes on freight trains, and as a result of these tests it was clearly shown that link and pin couplers could not be used on a freight train equipped with power brakes; so it may be asserted that it was not until 1887 that the idea of an automatic link and pin coupler passed definitely out of the minds of practical men.

At the twenty-first annual meeting, in 1887, the

Executive Committee reported "that this Association recommend as a standard form of coupling the Janney type of coupler; that the Association procure one of the present make by a committee appointed for that purpose, and then all other forms of couplers that will automatically couple to and with this coupler under all conditions of service are to be considered as within the Janney type and conforming to the standard of this Association. We believe that the office of this Association and of its members is with the mechanical part of railroading, and that what our railroads want and look to us for is a statement of what type of coupler best fulfils the mechanical condition of a perfect train connection. When we have done this we have performed our duty, and to our superior officers belongs the question of negotiation for the use of the couplers."

The report was adopted, and it was determined to decide by letter-ballot as to the adoption of the Janney type of coupler as a standard.

At the annual meeting, in 1888, the result of the ballot was announced as 474 in favor of and 194 against the adoption of the Janney type. It was further announced that the Executive Committee had undertaken to establish "the contour lines of this type, and the preparation of drawings and templets which would definitely determine and exhibit the standard of the Association."

In the performance of this duty, the committee discovered that the contour lines of the Janney type were covered by patents belonging to the Janney Car Coupling Co., and on June 17th, 1888, that company agreed "to waive all claims for patents on contour lines of coupling surfaces of car couplers used on railroads, members of the M. C. B. Association." This waiver was formally executed in April, 1888, as applicable to freight car couplers.

It is important to remember that it was not until 1887 that the fact was established that link and pin couplers and power brakes could not be used together on the same



freight train, with power brakes ; and that it was not until 1888, just four years ago, that the essential principle of the vertical hook-coupler, which years of experiment had established as the only type practicable for a safety car coupler, was made generally available by the generous action of the Janney Car Coupling Company. With these points secured, the road was made plain to the successful attainment of the result for which the Master Car Builders had striven for twenty years. What followed was mainly the filling-in of the details of the general plan. As the committee said, "The standard of the Association is, therefore, with the publication of these lines, definitely fixed; and it is in the power of any inventor or manufacturer of couplers, now or hereafter, to determine for himself whether his coupler will automatically couple to and with this standard, under all conditions of service. Invention can now be directed to improvements in detailed mechanism, in strengthening parts, and devising means for the protection of the couplers against the shocks and strains of service." This is the history of the evolution of the type of safety coupler which, at the meeting in 1888, was first called the Master Car Builders' Type. Well is that association of earnest railroad officials entitled to connect its name with this excellent work in the cause of humanity, and well may I add that this is their answer to the charge made at this late date that "There is no good reason to believe that the railroads will soon provide an adequate remedy of their own volition."

But, as I have said, there were still details to be filled in after the general plan was adopted; details relating to certain dimensions of the coupler and to its proper location with respect to the end-sill—minor matters, it is true, but which were to be definitely decided, one way or another, if every coupler of the Master Car Builders' type was to couple with every other coupler of the same type, never mind who invented it or who made it; and to insure their final recognition by letter-ballot, the matter was

carried over to 1889, when the coupler recommended by the Executive Committee was formally adopted, in all respects, as the standard coupler of the Association. But, as the Executive Committee stated at the meeting in 1887, "the office of the Association and its members is with the mechanical part of railroading, and what our railroads want and look to us for is a statement of what type of coupler best fulfills the mechanical condition of a perfect train connection. When we have done this we have performed our duty, and to our superior officers belongs the question of negotiation for the use of these couplers."

Some organized action was therefore requisite on the part of the managing officers of the railroad companies to make effective the action of the Master Car Builders at their meeting in 1889. This was sought to be accomplished through this Association. At our semi-annual meeting in April, 1890, I called this matter to your attention, using the following language: "There are improvements in methods and appliances now passing from the experimental stage, in which they are properly the subjects for consideration in technical associations, to the stage in which the responsible management of our railroad systems must decide whether they will recognize them as sufficiently valuable for general adoption." At the same meeting the Standing Committee on Safety Appliances, in its report on this and kindred subjects, said: "Although the Committee is not now ready to recommend action by this Convention, it must not be supposed that none will at any time be suggested. It hopes, on the contrary, to be able to present more definite views at your fall meeting." At that meeting the Committee recommended to the Convention the adoption of the Master Car Builders' Type of Automatic Freight Car Coupler as the standard of its members. Mr. Voorhees, Gen. Supt., New York Central & Hudson River R. R., moved the acceptance of the report and called for a vote by companies. Out of fifty companies voting, there were but two that

dissented; and it may be said that in October, 1890, the Master Car Builders' Freight Car Coupler was recognized by the railroad companies of this country as the standard coupler, so far as it was possible for this to be done by their organized action.

Let us now see what had resulted from the action of the Massachusetts Legislature in 1884, which provided that by March 1, 1885, the railroad companies in the State should have equipped their freight cars with such forms of safety couplers as the Railroad Commissioners might prescribe. In September, 1884, the Board prescribed eight different kinds of couplers. In January, 1888, the Board reported that only 2,500 cars had been so equipped. In January, 1891, the Board reported that it had "in contemplation action looking to a revocation of some of the approvals heretofore issued," and that it had generally approved of all couplers of the Master Car Builders' Type.

This was virtually a confession of the failure of the compulsory legislation of 1884 to accomplish anything in nearly seven years, and an acknowledgment that all which had been accomplished up to January, 1891, was the work of the master car builders of the railroad companies. Still Massachusetts did not lose faith in compulsory legislation on safety appliances, for in 1890 its legislature passed a resolution urging upon Congress to instruct the Inter-State Commerce Commission to recommend the railroad companies to take some action in this matter and to suggest such legislation as might seem necessary or expedient. The Inter-State Commerce Commission called a convention of the State Railroad Commissioners, which in May, 1890, resolved that the State Legislatures should require freight cars to be equipped with "an automatic coupler of the Master Car Builders' type," and recommended Congress to take similar action.

In the same month the Railroad Commissioners of Michigan withdrew the approval given in 1886 to seven different kinds of safety couplers, and authorized the use

of "Janney, Dowling, Gould, Hinson and other couplers of the Master Car Builders' type."

The action of the State Legislatures and of the railroad commissions induced the President to refer to this subject in his message to Congress of December, 1890, in the following language: "It may still be possible for this Congress to inaugurate, by suitable legislation, an amendment looking to uniformity and increased safety in the use of couplers and brakes upon freight trains engaged in interstate commerce. The chief difficulty in the way is to secure agreement as to the best appliances,—simplicity, effectiveness and cost being considered. This difficulty will only yield to legislation which should be based upon full inquiry and impartial tests. The purpose should be to secure the co-operation of all well-disposed managers and owners; but the fearful fact that every year's delay involves the sacrifice of 2,000 lives and the maiming of 20,000 young men should plead both with Congress and the managers against any needless delay."

The report of the Inter-State Commerce Commission for the year ending June, 1890, gives 369 killed and 7,482 injured in coupling cars; but, accepting the President's figures as correct, it is disheartening to feel that our deliberate, organized action of October, 1890, should not have been recognized, although it was directly in line with his recommendation of December of the same year. The President stated the difficulty in the way of uniformity to be that of securing agreement as to the best devices. He says that this difficulty will only yield to legislation which should be based upon full inquiry and impartial tests, and pleads for the co-operation of all well-disposed managers and owners—co-operation which had been publicly, officially and efficiently given two months before the date of his message to Congress.

In March, 1891, there was another meeting of the State Railroad Commissioners held under the auspices of the Inter-State Commerce Commission, at which a committee

was appointed to present a bill to Congress for hastening and insuring the equipment of freight cars with uniform automatic couplers, and, before presenting a bill, "to give a hearing to accredited representatives of such organizations of railroad officials or employees as may desire to be heard." In response to the circular notice as above, dated May 22d, your Executive Committee, at the time representing over 122,000 miles of railroad, signified its desire to act in harmony with the National Convention of Railroad Commissioners, and suggested a conference in time to properly present the whole subject at our October meeting. Nothing came of this proposition, and the Committee of Railroad Commissioners gave the promised hearing in this city on Nov. 10th, 1891, at which your Executive Committee and Committee on Safety Appliances were present, as also a committee from the Master Car Builders' Association, to inform the Committee as to the action already taken by our associations and to express an opinion adverse to the necessity for compulsory legislation. We heard nothing as to the results of this hearing, except that the Committee had been unable to agree upon a bill, a report which we found to be true when we were invited to another hearing by the same Committee held in Washington on Feb. 14th. It was made evident at that meeting that the Committee could not agree upon a bill to be presented to Congress, and at the hearings which followed during the next two days before the Inter-State Commerce Committees of both the Senate and House of Representatives this Committee failed to appear, though some of its members presented their individual opinions.

This is a brief but correct outline of the history of the action on safety appliances by railroad organizations, by State Legislatures and by State Commissioners up to the present time, and I think that you will agree with me in the opinion that the railroad companies have no reason to be ashamed of their record. We are now facing the possibility of immediate legislation of a compulsory char-

acter, insisted upon as an urgent matter of national importance, and also the probability that, in its eagerness to respond to the appeal for protection to railroad employees, Congress will act without sufficient knowledge as to what has been done and without a proper appreciation of the unfavorable effect which injudicious legislation will have upon the very cause in which we are interested equally with the employees who are to be protected. This will undoubtedly be the case if the principles should prevail which are embodied in some of the numerous bills now under consideration by congressional committees.

These bills generally provide for compulsory legislation of a penal character, intended to insure the general adoption by railroad companies, within a given time, of some form of safety coupler for freight cars. The difficulty in the way of prescribing the form of safety coupler with that exactness necessary to make a penal statute effective is said to have prevented the Committee of Railroad Commissioners from agreeing upon a bill, and the same difficulty has evidently been experienced in framing the bills now before the congressional committees. This difficulty it has been sought to avoid in various ways ; in some of them by a vote of "members of established and recognized organizations of railroad employees" for the most popular safety coupler, just as they might vote for the most popular conductor or superintendent. In other of the bills resort is had to commissioners, who, at the public expense, are to either select a coupler already patented or to devise one themselves. The more or less remote possibilities with such a commission are enough to make such a position more desirable than any other that Congress or the President could bestow. In one or two of these bills there is a recognition of the existence of the Master Car Builders' type and the evidence of an earnest desire to bring about in the interest of humanity the early and general adoption of that type of coupler. For the spirit evinced in such bills we should all have profound

respect, even though we should be skeptical as to the results.

The choice of a standard coupler by popular vote of railroad employees recommends itself, as a matter of course, to those, even, who look for political preferment through the support of labor organizations, but to others it really seems as the obvious way of arriving at a correct conclusion. To those who sincerely hold this opinion we may say that the brakemen and switchmen are no more called on to be acquainted with the proper dimensions and internal locking devices of a vertical hook coupler than with the dimensions and internal mechanism of the watches which they carry. They have only to manipulate the release rod of the one as they have to wind the key or winding stem of the other. That is all they need to know about either, and it is about all that many of them ever will know about a vertical hook coupler. Is it to be held that a matter which has demanded the time and thought of mechanical experts for twenty years in the evolution of the Master Car Builders' type is to be set aside by the popular vote of men whose attention has been concentrated upon the admirably dexterous manipulation of a link and pin? No wonder that many of them express a preference for the device which they have learned to handle with a facility which makes the uninitiated tremble for their safety when they see such a performance take place amid trains of moving cars. The fact is, that the only justification for legislative interference in this matter is that such interference is essential to the protection of railroad employees, and that such protection can be obtained in no other way. If the man engaged to couple cars does not go between them, he is sufficiently protected from injury, and if the railroad company provides a device by which cars can be coupled and uncoupled without the employee going between the cars, there can be no just occasion for legislative interference. This is exactly what has been done by the Master Car Builders and by the American Railway Association.

That device is a rod which projects from the side of the car and which has only to be turned partly around to uncouple the car to which it is attached. So long as that rod is there the brakeman or yardman can uncouple the cars without going between them, and so long as that rod fulfils this purpose it is no affair of the yardman or brakeman as to what is at the other end of the rod. But it is of a great deal of importance to the railroad companies, owning together over a million cars. For the change of couplers on all these cars represents to them over \$25,000,000, and it is their responsible managers, and not the switchmen, who must see to it that this immense sum is not misapplied. This is what has already been done by the adoption of the Master Car Builders' type. Adopted generally in October, 1890, we have reason to believe that it has already been applied to over 200,000 cars, or about one-fifth of all the cars in service, and we have reliable information that in all new construction, say on 25,000 cars now being built or under contract, this coupler will be generally applied. What more can be hoped for from a popular vote of employees? The demand for a removal of all these couplers and the return to the link and pin type? Such a demand has been voiced before the Committee of Railroad Commissioners, as well as before the congressional committees, and the demand has been eloquently enforced by gestures made with hands maimed in the use of just such link and pin couplers. This anomaly in human nature is bewildering to those whose hearts are filled with sympathy for these unfortunates, but it is understood by those who are familiar with railroad service. It is due, primarily, to a reluctance to change from old habits and devices with which we are familiar to those which are novel and strange; next, to a fear that, because of the safety that attaches to the operation of the new device, new men will more readily undertake to fill the positions of switchmen. But there is yet another motive, which has a more rational foundation,



and that is the greater difficulty that attaches to coupling a Master Car Builders' coupler to a link and pin coupler. While this great difficulty should be recognized, it does not follow that there is also a greater liability to injury. In the absence of reliable statistics on this point, it may be assumed that, because of the greater difficulty, greater care is habitually exercised in making such couplings and a corresponding diminution in the number of casualties. Be this as it may, such casualties can only occur during the period of transition from the link and pin to the Master Car Builders' coupler, and it has been frequently proven by figures that they must rapidly diminish in frequency after half the number of cars in service have been equipped with couplers of the latter type. The outcome of a popular vote of employees as to a choice of couplers is foreshadowed in an experiment of this kind mentioned in the Massachusetts Commissioners' Report of January, 1891.

It seems that, after the publication of the President's message, to which I have already referred, the New England Railroad Club undertook to obtain from employees engaged in handling cars an expression of opinion "as to the form of coupler which best combines uniformity, automatic action and safety." Out of 1,948 votes, 1,239 were for the Safford Automatic Link and Pin Coupler, 585 were for couplers of the Master Car Builders' type, 63 were for the old link and pin, and the remaining 61 scattering. The Safford Coupler is a great improvement on the old link and pin, but its use with power brakes would be just as impracticable, yet this does not seem to have weighed with the majority of the voters. One objection to the Master Car Builders' type was the difficulty and danger in coupling to it with a link and pin, an objection already shown to be transitory; another was that it could not be made strong enough to withstand the blows to which it must be submitted in terminal traffic, an objection which experience has shown to be without foundation; another,

that the expense for repairs would be so great. I make this reference to show how an important question like this would be handled in a popular election contest, and to contrast it with the result of the careful thought expended upon the same question by the Master Car Builders' Association.

So much for the idea of determining by a vote of employees how the railroad companies shall spend \$25,000,000 on couplers—an idea which pervades much of the proposed compulsory legislation.

Another idea is that of determining the same matter by a commission composed, for instance, of a master car builder, a yard switchman, a railroad operating official and several outsiders. This commission is to investigate the merits of all couplers presented to them, and the coupler decided upon by a majority of this commission the President of the United States shall proclaim to be the standard safety coupler. Would such a commission be any more competent to decide the question than the commission of technical experts termed the Master Car Builders' Association, or that of managing railway officials termed the American Railway Association? The superior competency of the latter can only be disputed by impeaching the good faith of their members.

And what is there for the proposed commission to determine? It must either decide in favor of the Master Car Builders' type or against it. If the former, such a decision is unnecessary, for railroad companies representing 123,000 out of the 175,000 miles of railroads in this country have already made a similar decision. If such a commission were to decide against the Master Car Builders' type, they must decide in favor of something else. What would that something else be? We know of no other type of coupler in actual use than the link and pin, a type which, as practical tests have shown, cannot be used with power brakes in the same train. Let us leave the advocates of a congressional commission in this di-

lemma and consider another aspect of compulsory legislation.

It has been said to us : " If you oppose the selection of a safety coupler by a plebiscite of railroad employees or by a congressional commission, what sort of compulsory legislation do you favor ? " Our answer may be made in the language of the Massachusetts Railroad Commission : " Those who urged that there should be no legislation at all upon the subject, claimed that the railroad companies were proceeding in the development and adoption of automatic couplers as rapidly as possible, and that any legislation would be likely to saddle upon the country some device, unsatisfactory and imperfect ; would impose upon the railroad companies great expense with no corresponding benefit to the employees, and would, in fact, be a bar to progress towards perfection. This argument is of weight and should not be disregarded, unless the circumstances are of a nature so exceptional as to justify a departure from a principle of legislation which for many years has been generally adhered to in this State with satisfactory results."

By this statement of the Massachusetts Commission we should be willing to abide; that there is no reason for compulsory legislation unless the circumstances are of a nature so exceptional as to justify it. The only justification for it would be that the railroad companies will not voluntarily protect their employees from injury while coupling cars by the adoption of some safety coupler which has been proven in actual service to serve this purpose. This the companies, members of our Association, have already done without compulsory legislation. But some earnest and sincere friends of railroad employees who admit this say that compulsory legislation is needed to enforce the adoption of the Master Car Builders' Coupler upon that minority of railroad companies which stand out against it. To this we reply that, judging of the future by the past, we do not agree in this opinion. We

can refer them to the change of gauge of track on the Southern roads, a change of nearly 25,000 miles, substantially in a single day, brought about by organized action of the railroad companies themselves and without compulsory legislation. We can also point to the general adoption of the Master Car Builders' type of coupler on passenger trains—brought about also without compulsory legislation. We say to them that it was only a year or more ago that the freight coupler problem actually passed out of the experimental stage; that already it has been placed on about one-fifth of the cars in service, and perhaps on four-fifths of the cars now under construction. We may add that, when the time has come that those railroad companies which have urged this reform are themselves in a position to insist upon it, they will decline to receive any freight car not equipped with the Master Car Builders' type of coupler, as they do to-day with passenger cars. All that is now required to side-track a passenger car not so equipped is the car inspector's chalk mark, and that is all the compulsory legislation that we think will be necessary to side-track a freight car when the time has arrived to insist upon it.

If we are asked how long this desirable result is to be delayed, we must each give his individual opinion, for, after all, it must be a matter of opinion. Answering for myself, I will say, substantially, in less time than any advocate of compulsory legislation will insist upon. The good work is going on at an accelerating speed. While a year ago the Master Car Builders' Coupler was rarely seen on a train, now it is the exception to find a train without it. The principal manufacturers are enlarging their works to meet the growing demand. On our principal trunk lines it is the rule in repairs to use it in place of the link and pin coupler. With many companies the delay in the general adoption of the standard device comes from inability to make the necessary expenditure at once. The economic question cannot be lost sight of.

In these days of a small margin between the rate per mile and the cost per mile, large expenditures cannot be made from income account, and if they must be provided for from capital account many companies must wait until there is a market for their stocks and bonds. How could a compulsory statute with a penal provision be made to apply to a company under such circumstances ?

I have trespassed upon your attention beyond the usual limit of time, but I have been urged to do so by my desire to use this opportunity to defend the railroad companies against the charge of indifference to the welfare of their employees. I have sought to show that whatever has been accomplished in this matter of safety couplers has been the work of the railroad companies ; that it has been accomplished as rapidly as the state of the art would permit, and that their organized action through the American Railway Association has rendered unnecessary compulsory legislation on safety couplers.

## STANDARD CODE OF TRAIN RULES: BLOCK SYSTEM.

(October 12, 1892, at 24 Park Place, New York.)

I propose to-day to speak of matters of present interest to the members of the Association, relating to the Standard Code of Train Rules.

Although its adoption called in many instances for a decided departure from established customs, the manifest advantage of uniform rules and the merits of the code itself have prevailed over all opposition. To-day it is referred to in our courts of law as embodying the best modern practice, and the railroad management that ignores it handicaps itself in any litigation involving the reasonableness of train rules, or a failure on the part of employees to observe them. These considerations induced the Association to establish the Standing Committee on Train Rules, to pass upon questions as to the proper construction and application of the standard code and upon suggestions as to its improvement.

Some of these suggestions have come in the form of a report from a committee of the Train Dispatchers' Association of America, which, in October last, presented a memorial submitting certain amendments as the result of practical experience in its use. This action of the Train Dispatchers' Association is worthy of notice, not only for the intrinsic value of the suggestions, but even more so because of the interest taken by its members in the proper conduct of the important branch of railroad service entrusted to them.

In considering these proposed amendments, the Committee on Train Rules has had to keep in view certain principles which can not be lost sight of in the preparation

or modification of a standard code. Such a code should be applicable to the train service of all roads operated under what may be called the American method, and should contain all rules necessary to the movement of trains with safety. These rules should be expressed as briefly as is compatible with a clear understanding of them, and the same word should invariably mean the same thing.

In order that the code may meet the requirements of our largest railroad systems, and at the same time be used on single track roads with light traffic, those rules should be first laid down which are of primary importance and applicable to train service generally. To them should be added rules for operating double-track roads and such others as may be required for operating roads with exceptionally heavy traffic. The primary rules, those that embody principles which under no conditions can be disregarded with safety, constitute the groundwork of the code to be accepted and followed by all; while the secondary rules, those which are required for the proper conduct of heavy traffic, are to be adopted by each of us as our increasing business may require them. This is the only basis on which a code of train rules for general use could be founded.

To the matter of expression much thought should be given. Every word fairly capable of more than one meaning should be defined in the sense in which it is intended to be used.

While, in the preparation of the Standard Code the Committee on Train Rules undertook no more than to embody the best recognized practice, the step which it took to ensure accuracy in watches used by trainmen did away with a frequent cause of collisions in the allowance of time for variation of watches. The establishment of the double order for the movement of trains by telegraph and of standard forms for the transmission of such orders are also parts of the Standard Code for which we are indebted to this Committee.

For that code to be of general and permanent value it must not be subjected to frequent alterations. There is a large army of railroad employees and officials distributed over 170,000 miles of railway who should each of them be thoroughly versed in this code. They should be so familiar with its very language as to be capable of reciting it from memory. The rules will then readily recur to their minds in an emergency. It is for this reason that once the language of the code has been so fixed as to be incapable of misinterpretation it should not be changed except to conform to accepted improvements in train service, and then only after careful consideration.

Now that it has for some years been kept virtually intact, it has been found advisable to publish an edition under the auspices of the Association which can be appealed to as authentic in litigation and for other purposes.

If we recognize the advantage of having an uniform set of rules throughout the country, and if we admit that this Standard Code conforms in general to the best practice, those who have so far refrained from adopting it may well be asked to waive their objection to this or that rule and their preference for some other not recognized in the code, and to fall in line with the companies operating about one hundred thousand miles of road that have now substantially accepted it.

In what I have said I have sought to establish the necessity for an uniform code of train rules, a necessity which has been provided for in the code adopted by this Association. This code should not be modified in any respect except to conform it to accepted improvements in train service.

In this respect the Standard Code is deficient. It does not recognize improved methods of train service which have been to some extent in use for years on our best roads, and which are now deemed essential to the successful conduct of a heavy traffic. I refer to the means afforded for protection of trains against each other outside of the



efforts of the trainmen themselves. From one end of the code to the other there is nothing to show that it is customary in this country to provide any other means for such protection.

The "Train Rules" so called are, by themselves, applicable only to the operation of a single track road with a light traffic. For any considerable business, even on a single track road, they would be supplemented by "The Rules Governing the Movement of Trains by Telegraphic Orders." But when we go on a step further and provide for an increase of traffic by the use of "running sidings" as distinguished from "passing sidings," we get no aid from the code as to the proper rules to be observed in using them. Neither are double track roads recognized except in approaching the end of double track, as in Rule No. 94, or in passing from double to single track, as in Rule No. 95.

I have not brought these matters up to disparage the code. What has been accomplished in its preparation is of value to that large part of the mileage of this country which is single track, but the time has now come when the double track roads begin to call for recognition by the Train Rule Committee and to ask for a standard set of rules for the protection of their trains by methods which do not depend solely upon the intelligence or vigilance of train employees.

This opens up a new and extensive field of action for the Committee, partly well explored and understood, partly a debatable ground. It is not surprising that the members of the Train Rule Committee, mindful of their past experience in formulating and defending the present code, should pause and reflect before entering upon the far more difficult task before them. It is no holiday work for the amusement of their leisure hours. It draws freely upon the time and brains of men who are already burdened with responsibilities of no ordinary character, and it is

due to them that we should apprehend what it is that we have now asked them to do.

As I understand it, we have asked them to submit a set of rules for the protection of trains by methods which do not depend solely upon the intelligence and vigilance of train employees. On double track roads these methods are intended to maintain safe intervals between following trains by the use of signals which serve to convey certain information to the engineers of those trains.

The idea of maintaining intervals of time between trains has been realized in various ways, as by track sentries or by the display of signals at curves or at other specially hazardous points or by a record at stations, visible from passing trains, showing the time that the last train had passed in the same direction. The method of time intervals between following trains affords efficient protection so long as the trains maintain an uniform schedule speed, can be readily stopped within the recognized time interval and are not liable to unexpected delays between signal stations. These conditions prevail on roads doing principally a passenger business with light and frequent trains, and such roads can be and are now successfully operated under this method.

A heavy freight traffic cannot be satisfactorily conducted under a time interval between trains. The liability to unexpected delays between signal stations is great, and more time is required to stop the train than in passenger service, as also for flagmen to get back to the distance in which the following train can be stopped, due allowance being made for grades and curves. A proper regard for these different conditions compels an increase in the time interval which seriously embarrasses the service, especially as the intervening passenger trains must respect the same interval, and the resulting tendency is to restrict this interval within too narrow limits.

A comparison of rear collision reports will show that the most of them are with freight trains. Experience there-

fore proves that a time interval does not afford sufficient protection on roads that have a heavy freight traffic unless that interval be so extended as to seriously interfere with business—yet this was the only method available until it became possible to establish an interval of space by means of the electric telegraph. This method of conveying information had been for some time used for other purposes before it became the accepted medium for orders to trains, but even now that the Standard Code includes “The rules governing the movement of trains by telegraphic orders,” those rules are mainly a protection against butting collisions only. For protection against rear collisions it is not rules for moving trains that are required but rules for stopping them. We want rules for stopping them by the maintenance of a time interval for those who prefer that method and rules for stopping them by a space interval for those whose traffic has outgrown that method.

The maintenance of space intervals is no novelty, for it has been for years in use upon many of our roads. The appreciation of its value has become so prevalent that its more general adoption is demanded not only by the railroad journals but also in the daily newspapers. Why, then, does not our Train Rule Committee add to the Standard Code “Rules for the movement of trains under the block system”?

The railroad corporations elected under our rules as the members of this Committee select from among their own officials those whom they deem best fitted to represent them in this connection; the Committee has at its command the resources of our extensive membership from which to obtain any information required for the purposes for which it was constituted; this special subject has been before that Committee for over a year, and yet not even a preliminary report has been made. I do not propose to arraign these gentlemen before you to-day, but, being *ex-officio* a member of their Committee, to offer without their knowledge an explanation in their behalf. They

recognize the necessity for greater uniformity in the operation of trains under the block system ; they acknowledge that the Standard Code should include a set of rules applicable to this system ; they respect the call made upon them by the Association to furnish such a set of rules and would gladly respond to the call and yet they fail to do so. Being rather a looker-on than an active participant in their deliberations, I have not only observed their situation, I have reflected upon it. My conclusion is that their inaction, if I may so term it, is due neither to their inability nor to their indisposition to codify the ordinary practice in the use of the block system, but because they are in doubt as to the sufficiency of that ordinary practice to provide for the normal increase of train service on the roads where these rules are more anxiously desired, and because of the impending changes in the conditions under which the service is to be performed. To make clear to you what I have in mind I will outline briefly what these conditions have been, keeping in view the object to be obtained, the maintenance of a distance interval between following trains. The change of this interval from one of time to one of space was first secured through the aid of the electric telegraph, and the information thus obtained was transmitted by signal from the receiving operator to the engineer of the approaching train. This information was of a simple character, either that there was or was not a train in the space intervening between himself and the receiving operator. This was the fundamental principle of the "block" system, that the engineer of a train approaching a signal station was to be informed from that station whether there was or was not a train in the block ahead of him. The next step was to instruct that engineer as to the use he was to make of that information. There was no doubt as to the rule which he was to follow when the block was clear—he was to proceed. But what was he to do when he was informed that the preceding train was still in the block ? Was he to go ahead or not ?

The safest rule was to stop until the block was cleared. But just as increasing traffic became embarrassed by the time interval, so the same experience followed the institution of the space interval, and this embarrassment it was sought to remove by such a modification of the rule to stop until the block was cleared as permitted the following train to enter the block with the knowledge that it was not clear. This is the broad distinction between the absolute and the permissive block system. The former is not only safe but simple ; the latter requires that the rear of the first train in a block must be protected by flagmen with due regard to the relative speed of the two trains, to the curves and gradients of the track and to the distance in which the following train could be stopped. I think, therefore, that it is fair to say that the permissive block system is an improvement on the time interval only in this respect : that the engineer of the approaching train can be informed whether there is or is not a train in the block ahead.

I say that he can be informed, but it is possible that he may not be informed and, as a matter of fact, sometimes he is misinformed. This brings us to consider the manner in which this information is conveyed from the receiving operator to the approaching engineer. The latter must receive it through the eye or ear, by visible or by audible signals. If through the eye, the impression received must be either as to form, color or position. This opens a field of discussion as to how the visible signals shall be made. If by form, whether a ball, a banner or a semaphore arm ; if by color, what colors shall be employed and what they shall respectively signify ; if by position of several objects, what shall be their relative positions and what shall they signify.

At this point it may be well to observe that whatever differences of opinion there may be among experts as to the adoption of the absolute or the permissive block system, they ought to make an effort to reconcile their differ-

ences so far as to unite in recommending a uniform system of signals for conveying information to the engineer of an approaching train. The causes for their different opinions are all well founded, but they are not irreconcilable. It is true that they have become more involved of late through the introduction of interlocking switch plants, as I will mention later in my remarks ; but what I wish to impress upon you is that, in the operation of the block system, a code of rules for the guidance of train men is one thing and a code of signals for conveying information to them is another, and that neither should be confounded with the appliances for operating these signals. For the better understanding of my views as to the duty of the Train Rule Committee in this matter I will repeat that there are three separate subjects connected with the operation of trains under the block system :

First, The rules for the guidance of train men.

Second, The signals which are to convey information to them.

Third, The appliances for operating the signals.

The mention of the third subject brings up a matter which, by the rules of our Association, has been specially committed to the standing Committee on Safety Appliances, to consider and report upon all questions affecting the essential requisites of devices for interlocking switches and for block systems ; the other two subjects being properly within the purview of the standing Committee on Train Rules. As the three subjects are somewhat interdependent, your Executive Committee has requested that the two committees shall jointly consider them.

The necessity for this joint action is due to the bearing which the character of the appliances may have upon the character of the rules and signals, and here comes in another element to intensify the difficulties which our Committees have had to encounter.

The appliances for operating the signals are controlled directly by the operator at the entrance of the block, who

manipulates them in accordance with the information which he has received from the operator at the outlet of the block. The information that the block is clear or not clear is conveyed to the engineer of the approaching train through human agency, and the possibility of error is doubled, or rather tripled, by the intervention of two persons besides the engineer. He may either misinterpret or disregard the visible signals ; the receiving operator may misinterpret or disregard the information which is to control the display of the signals ; the sending operator may either transmit that information incorrectly or fail to send it at all.

Leaving out the rules for the guidance of train men and the code of signals, the block system, so far as it is in general use, is deficient in providing the means for the protection of following trains, because it does not eliminate the element of human fallibility. This defect railroad managers, signal manufacturers and inventors are trying to remedy, and it is because our Train Rule Committee is conscious of these facts that it has hesitated to endorse the block system as now used. Their hesitation has been increased by the contest between the several systems which have been devised to supplant the present system, and which are now in experimental use to an extent which promises to simplify the solution of the problem by an exclusion of that which has failed in trial. The effort to eliminate human agency begins with the normal state of the signal, whether the action of the operator at that point shall be required to inform the approaching engineer that the block is clear or that it is not. If he can only give this information under the control of the operator at the outlet of the block there is one mind the less to make a mistake. It is for the Train Rule Committee to so determine the normal state of the signal as to reduce the probability of its being misinterpreted or disregarded by the approaching engineer, and for the Safety Appliance Committee to determine the essential requisites of the appliances which

shall prevent the receiving operator from displaying a signal improperly.

Going to the other end of the block, we have to guard against the transmission of incorrect information to the receiving operator or the failure to send it at all. The latter contingency may be avoided if the normal state of the entrance signal can be changed only by the act of the sending operator, but the former, the protection against the transmission of incorrect information, is more difficult to secure. This man has to determine that the block is or is not clear, and then control accordingly the display of the signal at the other end of the block. He determines that the block is clear, first, from a notification that a train has entered, next by actual observation of its passage. It is not sufficient for him to know that an engine has passed out of the block, but also that every car which was attached to that engine when it entered the block passed out with it. That some such protection should be required by the rules is within the province of the Train Rule Committee, as it is the province of the Safety Appliance Committee to determine the essential requisites of the appliances by which that protection shall be secured.

Admitting that the operator at the outlet of the block is correctly informed that the block is clear, we have next to ensure that this information is correctly transmitted to the entrance and the signal properly displayed. The respective duties of our two committees in this matter are also obvious.

If the rules, signals and appliances for the use of the block system can be successfully wrought out to this stage then there is yet another step to be taken, which shall eliminate the intervention of the sending operator. This has been experimentally accomplished by several devices actuated by the train as it passes the entrance and outlet of the block, simultaneously operating a display of the signals required to block the interval which it is entering



and to clear that which it is leaving ; indeed, this effect can now be extended to the next block behind it, so that the engineer of a following train is thereby informed, not only as to the condition of the block ahead of him, but also as to the condition of the block ahead of that.

This extended protection is required since the speed and momentum of trains have exceeded our ability to stop them within the distance in which, under all circumstances, the signal at the entrance of the block can be made visible to the approaching engineer. To meet this difficulty, and to avoid the consequently necessary retardation of the train, the entrance or home signal has been supplemented by the distant signal, and, in the system above described, the entrance signal of one block is the distant signal of the block next ahead. The circumstances under which distant signals should be required will affect the rules for operating a block system as well as the essential requisites for the proper appliances.

Here we seem to have reached the ultimate limit of the resources at present available for the protection of trains against each other, outside of the efforts of the train men themselves. There is another step which may yet be taken, that of protecting the trains against the misconduct or neglect of these very train men, by the introduction of appliances connected with the block signals which shall strike the engine gong or blow the whistle, or apply the brakes, or even close the throttle-valve of the approaching train, but these appliances have not reached such a stage of efficiency as to call for further notice in this connection.

Proceeding on a line parallel with the improvement of the block system, there has been a demand for greater security against derailment or collisions from misplaced drawbridges or switches or at railroad crossings. This demand has led to the introduction of appliances for controlling one or more such points from one location. For convenience of operation, this control has been gradually brought into accord with the control of the block system

signals and, as a measure of safety, that accord has been made interdependent by the introduction of interlocking plants that have developed into marvelously ingenious pieces of mechanism. In this development there have been involved the same questions as to rules, as to signals and as to transmitting information to train men and to operators that have followed upon the development of the block system and, as a consequence, there has come about a complication which our Train Rule Committee can not disregard. It is the confusion that may arise as to whether a signal is intended to show that a switch is or is not right for an approaching train or whether it is intended to show that the block ahead is clear. On a few of our trunk lines a still further complication has arisen which will extend with increasing traffic. This is occasioned by the construction of additional running tracks so that the train rules and signals are required to provide for running trains on more than two tracks. While this is not a pressing want just now, it may well be provided for in a code of standard rules for a block system, in order to ensure consistency with that code in the further development of such service.

The intervention of mechanical appliances in the movement and control of signals, switches, drawbridges and crossings and the interlocking of such appliances have induced the substitution of other motive power for the muscular power of man, and to-day we employ steam, compressed air and electricity for this purpose, either singly or in combination. To what extent this substitution should affect the standard block system rules or the appliances required by those rules are matters that even our Standing Committees may not pass judgment upon without the aid of those who are expert in the application of such forces to our purposes.

I will not refer at greater length to the task now before our joint committee on Train Rules and Safety Appliances and hope that what I have said in explanation of the diffi-

culties which they have encountered will be sufficient to justify their tardiness and in some measure to indicate the course which they must pursue.

In your criticisms upon their reports and in your anticipations of the result of their work you should be restricted by the same considerations which control them, viz.: that our Association undertakes no more than to establish the best modern practice as recognized by the majority of our members and only in those matters in which a uniform practice is essential to the best results, or, to use the language of our Rules of Order, "the development and solution of problems connected with railroad management in the mutual interests of the railroad companies of America."

One of these problems is the development of a Standard Code of Train Rules, and this problem can only be said to have been definitely solved when trains can be run frequently at high speed from start to finish without time card or train order, secure against derailment or collision and controlled only by the block signal.

## VALUE OF CO-OPERATION IN THE CONSIDERATION OF QUESTIONS OF RAILROAD MANAGEMENT.

(April 12, 1893, at Grand Pacific Hotel, Chicago, Ill )

For the first time since this Association was formed at Cincinnati, in 1886, it meets outside of the City of New York, and the moving cause which has impelled us to hold our semi-annual meeting here to-day is the desire to get closer to the domiciles of our western neighbors, with the hope thereby to increase their interest in our work and in the purposes for which we are associated together. These purposes are surely worthy of attention by those who are responsible for the efficient management of the railroads of this country. They are formulated in our rules of order as "the development and solution of problems connected with railroad management in the mutual interest of the railroad companies of America." How far the Association has fulfilled these purposes a reference to its proceedings will show, in its treatment of the problems of Standard Time, Standard Train Rules, Standard Freight Car Couplers and Car Service Associations, while there is much which it has accomplished which is not recorded in these proceedings. The frequent conference of the leading railroad managers of the country, with their minds devoted to subjects affecting the welfare of our national railroad system as a whole, could not but result in a better understanding among them on many points incidental to the principal topics under discussion, and I count among the benefits growing out of these gatherings the prevention of that condition of mental isolation which is often unconsciously assumed by men situated as railroad managers are.

The general manager of a railroad is burdened with a responsibility which others cannot share with him. He may invite their opinions, but if he acts upon them he must assume them as his own. It is sometimes difficult for him to make other minds comprehend his reasons for doing things one way rather than another; perhaps there are conflicting conditions so nearly balanced that his decision is rather the result of a judgment matured by long experience than of a definite reasoning from cause to effect. Only a man of positive character can have the executive ability requisite for such a position, and such a mind trained in this way tends to the isolated condition to which I have referred, and it is with this in view that I have laid some stress upon the incidental advantage to be derived by such men from affiliation with their peers in the committees and in the meetings of **our** Association.

Though I speak of that benefit as incidental which follows from the interchange of conflicting views between railroad managers, I do not mean thereby to lessen its advantage to them nor its value to the interests which they represent.

It has a narrowing effect upon any man to go by himself and do his own thinking, and this is eminently true in thinking about the multifarious aspects of railroad management. One man cannot know it all. The more earnest he is the more probable it is that he will gradually draw away from the broad road along which the consensus of experience is guiding his fellows, into a pathway where he is neither seen himself nor can see what others are doing.

It is particularly unfortunate when a railroad manager follows this course in matters which involve the operations of connecting railroads or which could be more satisfactorily handled in concert with their managers. The more extensive the railroad system entrusted to the management of one man the greater the possibility for him to become isolated in the way that I have described, and when I con-

sider that here, in this great city, there are concentrated more miles of railroad under the management of fewer men than in any other city in the country, it seems to me that this is the proper place to make an appeal to our western members to increase their interest in our work, and to invite those who have thus far held aloof to come with us and give us their assistance in carrying out the objects for which our Association has been formed.

The resources thus created by co-operation are available for the purposes of each railroad company in our membership, and any one of you who will call to mind that this membership now represents a mileage of 128,000 miles, or nearly eighty per cent of the total mileage in this country, can perceive what strength there is in such a union, what opportunity for mutual profit in thus standing together for the common welfare.

The tendency of the social forces which have been developed under our present form of civilization is toward co-operation. Complain of it, oppose it, legislate against it, but it is in vain, for this is a characteristic feature of the age in which we live. Other interests recognize it and avail themselves of it, and why should it be disregarded by the most important interest in the country—the interest, in fact, which has made our country what it is? Competitors though railroad companies may be for traffic, they have a common interest in securing to their patrons the best service and to their stockholders the most economical methods of operation. These are the objects for which we have associated ourselves together, and which can be most surely attained through such co-operation, for what is the effective force of even the largest railroad corporation in this country as compared with the influence exerted by an associated mileage equal to that of all Europe?

And when we look ahead to the task which is to be undertaken in the near future by the railroad managements of this country they may well call on each other

to rally together in a common effort to accomplish what will be expected of them.

I have said that one characteristic tendency of the age in which we live is co-operation. There is still another—specialization—and just as there is a tendency to specialize in manufacturing and in the professions, so there is a tendency to specialize in the operations of railroads.

At first railroads were operated with mixed trains, then the passenger service was separated, through service from local service, and now we have limited or suburban passenger trains, cattle trains and perishables and refrigerator trains, all evidences of this tendency to specialize as the traffic increases in extent and becomes more diversified in character. But it is not alone the train service which is thus specialized; the time comes upon roads with rapidly increasing business when these varieties of train service cannot be all conducted upon the same track, and we see roads double tracked to separate the trains running in opposite directions, and even four-tracked roads to separate the passenger from the freight train service. This separation of tracks, as well as trains, has not reached its ultimate limit. We have increased the capacity of our freight cars, the number of cars in a train and the number of trains in freight service as well as in passenger service. On most of our roads we have these trains running along on the same track at different speeds. We are abandoning the effort to keep these trains at safe distances apart by time intervals, and are adopting space intervals instead. What we know as the permissive space interval we feel must be superseded by the absolute space interval. The maintenance of this space interval by human agency, frail and at times negligent, is being replaced by automatic devices which neither sleep nor forget. With more frequent and faster trains the space intervals must be shortened until the limit is reached within which a train can be stopped on signal, and yet the public cries for more ! For more speed ! For more frequent service !

When mechanical engineers speak of a possible speed of a hundred miles per hour, I ask myself where is the railroad upon which such a speed can be maintained for even one hour at a time? Is there such a road in existence in this country to-day? This may well be termed "an iridescent dream" of the engineer until the thoroughfare has been provided upon which it can be realized. It must be a thoroughfare indeed, with a surface like a billiard table, without grade-crossings, with frequent signals protecting the train absolutely for at least one mile in front and rear, and the continuity of the rails in that interval likewise secured and indicated by signal. Gradients and curves must be dominated by a recognition of the rapidly decreasing ratio of efficiency where momentum is one factor as against gravity and centrifugal force. Where is there such a road in this country? A road where a scheduled passenger train speed of one hundred miles per hour can be maintained for one hour? You will all agree with me in saying that there is not one. And yet the theorists are demonstrating that it is possible, the newspapers are spreading the news, and soon the public will think they ought to have it. Once they get that notion well fixed in their minds some enterprising manager will try to give it to them, and then others will follow suit. But as none of you have the ideal road for such service, you will do in the future as you have done in the past. You will eke out the deficiencies of your roadway by drawing upon that reserve of ingenuity in device and of fertility of resource which seems to spring eternal in the brain of a typical railroad man.

And it is not alone in passenger train service that this increase in speed will be demanded. When our freight trains can be operated entirely with power brakes and vertical hook couplers, what an improvement there will be in their speed also, thus increasing the complication in which your service is to be involved!

I have said that these difficulties are to be solved by



ingenuity and by fertility of resource. But these brain forces must have material substance upon which to act. You cannot throw away the roads that you have. You must make them better fitted for the new service demanded of them. And here you are brought face to face with a familiar acquaintance—the financial bugbear—where is the money to come from? From income account? You know well enough what it is to have to explain an increased ratio of expenses to earnings, and you will be eager for a betterment account to be provided for by the sale of bonds or stock or in any other way except by a charge to operating expenses. But when you shift this burden from your own shoulders to the broader backs of the president and board of directors, you have only put off the evil day for yourselves, for with an increased bond or stock account there must come a like increase in surplus available for fixed charges or for dividends.

That accelerated speed means improved appliances, and that improved appliances mean further expenditure, which means the necessity for greater net revenue, is a chain of reasoning which, with men of your experience, calls for no argument. To reach these results the first necessity is money, and this money must come directly or indirectly from those who are to be benefited by the improved service. If they want it they must pay for it. And here you must appeal to the traffic department for better rates, for you are steadily approaching the point at which the unit of operating cost cannot be further reduced. Steel rails, iron bridges, heavier engines, and cars of greater capacity have yielded up to you most of their available help. What remains to be saved in that way is but little. There is yet something to be looked for from better fuel performance and from the preservation of crossties and timber, but otherwise the outlook for decreasing the cost per train mile and per car mile is not inviting, unless it may be in the direction of better

methods and of better discipline. Here we are again brought in contact with the motto of the American Railway Association, "the development and solution of problems connected with railway management in the mutual interest of the railway companies of America." Here we have the two characteristic tendencies of our times brought together—specialization and co-operation, and here it is that each of you has need of the others in order that what is lacking in money to meet these demands for better service may be made good by your joint experience and ability and by bringing to the aid of the Association the ingenuity, the observation, the experimental research which is possessed by the staff of loyal, earnest and zealous men which each of you have about you and from among whom must come those who are to do your work when you have gone.

In the organization of our association there is opportunity for these men to serve on our standing committees, and in doing our work they are also serving themselves.

Let me then repeat my entreaties that you should one and all renew your interest in our affairs, that you should recognize that they are your affairs,—affairs of as great moment to the corporations which you represent as are the matters for which you are individually responsible. Make it a point to attend the meetings, to take your part in the committee work. Do not leave a few men as busy as yourselves to take all this burden for your benefit. Respond promptly and completely to the circular letters calling upon you for information. When you receive a telegram calling on you to render some special assistance, either personally or otherwise, give your mind to it and see that the help is given. This is the sort of co-operation that is wanted to make our Association fulfill its beneficial purposes,—purposes in which the welfare of the traveler, the shipper, the employee, the official and the stockholder are alike involved.

I speak from experience as to the good which the Association has done, and by the light of that experience I see what more it can do if you will be but true to yourselves and to your companies which make up the membership.

I speak thus emphatically because I am about to retire from the honorable position which I have now held for six years. While I have given during that time much attention to your affairs, which either had to be taken from my hours of labor or of rest, I have done so cheerfully, because of the willing helpmates who surrounded me. Not only as your presiding officer, but also as an ex-officio member of your standing committees, I have seen how these men, few in number, have carried on the work of the Association. It is unnecessary for me to refer to them by name. You have seen them on the floor at our meetings, their reports are recorded in your proceedings. To them you are indebted for Standard Time and Standard Rules, for uniformity in safety appliances and for car service associations. And in the time to come there are yet other problems for them to solve in the interest of better service and of better results. Come, then, to their aid as I have besought you, not in the way of spasmodic impulse, but in steady all-the-year-round support, and you will find that in the American Railway Association you have a central organization which can be made not only the focus for the dissemination of uniform methods, but also when necessary a rallying point for mutual protection.

## LABOR ORGANIZATIONS.

(October 11, 1893, at the Auditorium, Chicago, Ill.)

The dominant purpose of the American Railway Association is the development and solution of problems relating to railroad management in the mutual interest of the railway companies of America. Some of the problems which have been before the Association it has solved definitely, others tentatively. Some of them were capable of but one solution, others have presented themselves in different aspects according to the point of view and varying with the current of events and of opinions. Those which were simple and urgent it attempted first, but with increasing experience and with improved methods, and perhaps encouraged by the favorable reception accorded to its work, it has gradually broadened its scope to include yet graver questions of management and of operation. Such a subject is now engaging its attention in the establishment and endorsement of proper rules and signals for block signals and for interlocking switches, and the expectant attitude of those interested indicates the importance which is now attached to its conclusions. This fact is appreciated by the members of the Joint Committee which has the matter in hand. It has intensified their sense of responsibility and their anxiety that their report should be adequate to our expectations. It has been usual with our committees in the investigation of any subject to ascertain the practice of each member of the Association and then to recommend that course which corresponds to the generally prevailing opinion. But in this particular matter something more has seemed to be necessary. There has been occasion to harmonize conflicting views, to clear away by discussion and debate differing con-

ceptions as to fundamental principles, and, as the subject developed, it became evident that the whole question would have to be treated more with reference to what would be required in the immediate future than to what had been the practice in the past.

It is not my intention to forestall the report of the Joint Committee, nor to outline its purposes, but rather to impress upon you the difficulties it has had to encounter in the development of the problem which it is expected to solve. For the development of a problem is a process necessary to its solution, and if a fault confessed is half remedied, so a problem developed is half solved.

Something of this idea I have had in mind in thinking over certain problems connected with railroad management which are still ahead of us, and not so far ahead of us either but that they are looming up before us, assuming portentous magnitude. Concerning one of them I propose to speak to you to-day ; one which a few years ago could only be mentioned with bated breath in official circles, but which now is not merely in our minds, but on our tongues, so that I feel that no further apology is required in introducing the subject here.

That problem is the proper attitude of railroad corporations toward labor organizations, and that I may speak my mind freely, I will remind you that I am speaking for myself and not as an official representative of this Association. I will speak the more freely, because I reserve the privilege of modifying hereafter the views that I may now express. For this is one of those problems to which I have already referred as presenting themselves in different aspects, according to the point of view and varying with the current of events and of opinions. It is also one not to be handled gingerly and timorously, if it is to be treated instructively, but it must be grasped firmly as one would grasp a thistle to prevent unnecessary irritation. And I shall devote myself rather to the development than to the solution of this problem.

It is not a novel one in its elementary features. It is no new thing for the workman to be dissatisfied with the terms and conditions of his service. Such dissatisfaction dates back to the time when the Israelites refused to make bricks for the Egyptians without straw. But those were slaves, and so the workingmen continued to be slaves down to the middle ages, when in France and England they revolted against their oppressors, to be put down by force. It was only through violence and turmoil that they obtained some measures of relief, and the artisan and the laborer continued in a more or less pronounced condition of servitude, even in the most civilized countries of Europe, until the last restraints of bondage were consumed in the fires of the French revolution. Those who would harshly criticise the efforts of European workmen to join in measures of self-protection should not forget the centuries of wrongs which they had to endure. Because they have been greatly sinned against much must be forgiven to them. But it may be asked what has all this to do with this country? Workingmen here have never had to pass through such ordeals or to submit to such oppression. Indeed they have not, and it was to mark this very contrast that I have emphasized the conditions through which the workingman has had to pass in Europe. If ever there was a country in which the sons of toil have enjoyed the fruits of their labor unrestricted by any law that did not bear with equal force upon their fellow-citizens, it is this country of ours. In fact, I will say that there has never been such another. And therefore, when we come to discussing the relations of the employer and the employed, of the man who works and of the man who pays him—we have not to overcome or to forget the prejudices, the passions, the bitter recollections of centuries of oppression represented by violence, which complicate and embarrass the adjustment of such relations across the ocean. We have here to look upon it as but a business issue between men who are by birth and by law the equals of each other in all respects

so far as they are alike honest and disposed to deal fairly. Even in the matter of compensation for service performed there is no further obligation than on the one hand to do that which was to be done, and on the other to pay that which was to be paid. When these two things have been fairly accomplished the reciprocal obligation has been discharged, and there is no favor on either side. This is the underlying relation of labor and capital in this country, of the employer and the employee, and it seems so simple where it is not mixed up with old world prejudices and memories, that one is inclined to wonder why there should be so much difficulty in adjusting so simple a matter ; why it has come to the front as one of the spectres at the banquet which will not down at any one's bidding. The difficulty arises in adjusting the terms and conditions upon which the service is to be performed. When differences arose as to these matters, they at first assumed the form of mutterings of dissatisfaction on the part of the employee which were disregarded by the employer. Then the mutterers joined in a chorus which found full voice in a committee specially chosen to appeal to the employer. Here the employer threw the first stone. He resented the attempt to unite in complaint by discharging the leaders ; the strongest or the loudest, at any rate the foremost, among the workmen. What was left to them but to prolong, to intensify, the agitation for self-protection and to retort upon the aggressive employer by organizing a strike. The strike was answered by a lock-out, and the response was a boycott. These efforts at organization among workmen were temporary and disorderly. As passions were aroused by opposition, the leaders lost control, the outside mob took charge of the situation, which passed from a dispute into a riot. At this point when public quiet was disturbed, the representatives of public order interfered and peace was enforced.

It is to the credit of the leaders of the better paid trades that they soon recognized the folly of such a course and

directed themselves to organizing permanent associations, efficiently regulated and controlled and prepared for strikes by accumulated assessments. For after they were thus organized they were able to oppose an orderly refusal to work to the refusal on the part of the employer to yield to their terms. A strike under such conditions was not a breach of the peace, and the strong arm of the law could not be wielded against their cause. The only alternative was a lockout, and the pitched battle was superseded by the blockade. This gave time for heated passions to cool and for reason to resume its sway. Hence violent measures were replaced by discussions in which the arguments on each side could be heard by the other and a foundation laid for a compromise. A point had been reached in the adjustment of the relations between the employee and the employer at which the terms and conditions of service could be determined by contract. This is exemplified in the iron trades, where the scale of wages is established by committees from both sides, in which the state of the market, present and prospective, the financial outlook and even political theories are taken into consideration. It is truly a rational method, affording full scope for the exercise of judgment, experience and persuasion in arriving at a conclusion. But if wilful perversity or ignorant selfishness prevail in the councils of either side, the strike or the lockout must be renewed. This dilemma admits of but one solution—the submission of one party to the demands of the other. An alternative solution could be found in arbitration but for the difficulty in enforcing the finding of the arbitrator. As yet the lawyers do not look kindly on arbitration, and the law does not lend itself readily to such an invasion of its jurisdiction. And again, while one party, the employer, is a substantial fact, a person or a corporation that the law can reach, the other party to the arbitration is neither the one nor the other. It is an irresponsible organization, invisible to the sheriff, against which no judgment will lie and upon its



assets no levy can be made. To this point, then, the development of this question has been reached, that the adjustment of the relations between the employee and the employer is recognized on both sides as a matter in which the terms and conditions of employment can be made the subjects of an agreement ; the means for arriving at such an agreement are at hand and are understood. If an agreement can be reached, well and good. If the opposing parties cannot agree, no third party can intervene effectively ; there is no way out but by passing under the yoke of submission. This is the situation as presented to us to-day, and which we must recognize if we seek to solve the problem which I have stated to be the proper attitude of railroad corporations towards labor organizations. It is a division of the subject of the relations of capital and labor which covers only one portion of the whole field, but a portion which is characterized by conditions peculiar to itself.

Industrial enterprises in general are engaged in the production of articles or materials to be consumed by mankind, they are manufacturing or mining enterprises ; their undertakings are of a private character ; their affairs are their own business and concern no one else so long as they are conducted in a lawful way. If one shoe factory, or cotton mill, or iron furnace is closed—whether from want of orders or from disagreement between the owners and their employees, it is not a matter affecting the public welfare. Their customers can go elsewhere for shoes, or cotton goods, or iron wares.

But railroad corporations are not, primarily, manufacturers or miners. They produce no articles for sale. They are carriers by land for hire, just as the wagoner or the carriage driver is, but with the further difference that in return for the exercise of the sovereign power in their behalf they are bound to a public service which they cannot evade. They are engaged, by day and night, in the constant performance of a personal service to each

passenger who travels and to each shipper of freight. They have, too, a special contract with the Post-office Department affecting everyone who reads a newspaper or writes a letter.

With this public burden to carry, an obligation essential to their corporate existence, they are at a disadvantage when they come to trying conclusions with their employees. The lockout is forbidden to them as a measure of defence. They can neither close up their stations nor stop their trains. If the railroad management cannot agree with the men as to the terms and conditions of its employment, it must, at its peril, find competent men to replace them and in numbers sufficient to maintain its service without inconvenience to its patrons. The public will be satisfied with nothing less, and so long as the men abstain from violence, the corporation and its representatives are alone held to account by the laws, by the many persons inconvenienced and by the newspapers. Under such a pressure, what wonder that railroad managers yield to demands to which their judgment does not give assent, or that employees gain from each successful step the assurance of submission to yet further demands? And when may we expect these demands to cease? Are they to be limited only by the desires of those who are in a position to enforce them? There is another limit, the financial ability of the corporations to satisfy them.

The percentage of pay-rolls to operating expenses has been constantly increasing, and this is the cause of the increasing percentage of expenses to earnings. It is stated that in the division of gross earnings the employee receives four times as much as the stockholder does. In 1891 less than one-fourth of the railroad stock received as much as 5 per cent., and over 60 per cent. received nothing. Is there any hope of a change for the better? Not until the rate per ton mile increases or the cost per ton mile decreases. In what direction can any of you here present look for a considerable reduction in operating expenses?

Will you use fewer cross-ties or buy less rails or burn less coal? No! You cannot find relief in this direction; you are dealing with physical conditions which you cannot control. You know that you can only reduce expenses by decreasing your pay-rolls. This you must do. And how do you do it? By reducing train service, to the public inconvenience; by postponing repairs of equipment, which is only putting off the evil day; by postponing much needed improvements. Anything, except a reduction of the rates of pay. You may discharge or suspend men by the hundreds, depriving their families of their daily bread, but you dare not distribute the burden among all your employees. You shrink from the unequal contest, and well you may. Experience has taught you that you have to meet a well-organized foe, handled by experienced and astute leaders, to whom implicit obedience is given, and with whom public opinion will side so long as it is not violently repelled. On your side you have a public service to perform, completely and unreservedly, under circumstances which, in case of strike, will strain you mentally and physically to the utmost, and in the background a board of directors sensitive to public criticism, and perhaps personally interested in stock speculations. Under such conditions the ordinary man will follow the line of least resistance, and refrain from doing that which his judgment recommends and justice demands—to make the reduction in wages bear in like proportion on all, or, if favoring any, to favor those who receive the least. But this you will not do. The reduction which must be made falls on those who are least able to resist, because they are without organization, upon clerks and track-men and unskilled laborers. I am not criticising you unkindly for this. I am stating a fact which you know to be true as well as they do, and you do this because you can find no other relief. But as time goes on these classes of employees, spurred to it by their own misfortunes and by witnessing the advantages which others have gained by or-

ganization, will organize themselves. Then where will the axe of retrenchment fall. That will be for you to determine, and you will be brought face to face with that problem, if the decrease in the rate per ton mile is to continue. You must appeal to the traffic management to refrain from that foolish competition which ignores the cost of the service performed, and not until they recognize the necessity for so doing may you hope to arrest this crisis toward which the most of our railroad mileage is tending, and which, when it does come, falls upon those responsible for the operations of the road. If they will not heed to your appeals, then you should plainly put the matter before your executive officers, and place the responsibility where it belongs. It is a matter in which you should make common cause, those who are managing prosperous roads as well as those who are not, for sooner or later you will all have to drink of the same bitter cup if measures be not taken in time to avoid it. Having developed my problem to its last bitter elements, I may be expected to suggest a solution, but it is one thing to develop a problem and another to solve it. The one is laying open the hidden cause of disease, the other is to apply the proper remedy. The one needs but a knowledge of the anatomy of the subject and a steady hand; the other requires a power of forecast, of following out the probable results of possible policies, which is given to few men, whether surgeons or railroad administrators.

What, then, I may offer in the way of a solution is presented with less confidence than has sustained me in the development of this subject. While as to the one I might withstand adverse criticism, as to the other I should be disposed to yield. But I think that there are certain conditions affecting the attitude of railroad corporations to labor organizations which are of so peculiar a character as to separate this branch of the subject from those relating to ordinary industrial enterprises. It is not a matter of manufacturing, selling and buying

goods. It is a matter of performing a public service continuously, safely and with dispatch, a service which affects every man, woman and child in the land to such an extent that railroad transportation is properly looked upon as a question of public welfare, a matter which has been aided by the sovereign power by loans and donations, by special legislation and by the exercise of the right of eminent domain. In return for this aid the corporations are burdened with obligations which they cannot evade and which render them powerless to resist the demands of their employees when efficiently organized. To the demands of these organizations neither the laws nor public opinion set any limits so long as they are not enforced by violence. Yet there is a public demand for lower rates which the traffic officials do not firmly resist.

The decrease in the rate per ton mile and the increase in the cost per ton mile cannot go on together indefinitely, one or the other must cease. Either it is to the public interest to have cheaper rates and lower wages or to have higher wages and dearer rates.

The public interest lies in better and safer, rather than in cheaper service, and a minute advance in the charge for that service, an advance so small that if divided among the millions of transactions for which the corporation is paid would yield a fund sufficient to insure fair wages to every railroad employee and reasonable dividends to every stockholder. For both stockholder and employee are paid from the same fund, and it is not to be expected that the railroad system of this country can be extended to meet the demands of a growing country and increasing numbers of employees continue to receive full wages unless capital so invested has a prospect of a reasonable return.

But if this were recognized as reasonable, that the compensation should be sufficient for fair wages and for reasonable dividends, what has the public a right to

expect? Certainly that the service shall be continuous and efficient, that it shall not be interrupted by disputes between employer and employee. It may with justice insist upon a rational adjustment of such differences, and if a way can be pointed out by which it can with propriety intervene, its assistance might be counted on for such a purpose.

The proper way to adjust such differences is by agreement, by an agreement between contracting parties, competent and responsible. As to the competency and responsibility of one party, the railroad company, there is no doubt, but as to the other, the employee, he as an individual possesses neither qualification. As well stand on the river's brink and seek to enter into an agreement with the current swiftly flowing by, a constant succession of drops of water, as to make a contract with a changing force of men, coming and going as each sees fit.

The very organization which they have made for self-protection may be made the means for enforcing their contract obligations. To this end, they should be duly incorporated under such restrictions as will ensure their legal competency to contract on behalf of their members. The responsibility for keeping these contracts will then rest with their incorporated organizations, which can, by assessment, accumulate a fund that can be invested safely where it can be reached in a suit for damages for breach of contract. There will then be no voluntary arbitration, to be viewed askance by bench and bar, but the same legal procedure will be available to secure an observance of contract relations between railroad corporations and workmen's corporations that apply to other business contracts. The legal recognition of such agreements will be a great step toward the preservation of harmonious relations between the two parties and the assurance to the public of uninterrupted railroad service.

A failure to agree upon the terms of a mutually satisfactory contract would still be possible, but only in the

event that the employees of each class were able to combine in single corporations. Past experience leads us to believe that this could not be done, that either from personal ambition or from other causes there would be independent corporations of workmen that would compete for contracts with desirable railroad corporations, and that in this way it would always be practicable to arrive at an agreement with one or another.

The terms and conditions which should enter into such agreements I will not at this time undertake to discuss. Whatever they may be, the public interest and convenience will always claim consideration in preparing them if public opinion and the laws are to aid in enforcing them. As I have said, it has been my purpose in these remarks to devote myself rather to a statement of the issues involved than to a solution of them. In doing this I have endeavored to take into account the principal factors which should be included and to propose a course in treating them which will not run counter to that spirit of co-operation that pervades the present era, and which we may expect to become still more influential in determining the destiny of our American railway system as well as of our country.

## OPERATING EXPENSES OF A RAILROAD.

(April 11, 1894, at Hotel Brunswick, New York.)

The inventions and improvements in colliery tramways which made railroads available for public use originated with practical mechanics, and gave such prominence to the profession of engineering that in those early days engineers alone were selected as railroad managers. The general acceptance of railroads as common carriers led to such a recognition of the importance of the art of transportation by rail that men who evinced an aptitude for handling trains successfully then became in demand as managers. With the increase in the number of railroads the competitive traffic virtually overshadowed the difficult problems in construction and transportation which had given value to the successful engineer and transportation official, and as the traffic manager got nearer to those who controlled competitive shipments his importance increased with the board of directors.

In the desire to augment the published gross earnings by a larger volume of business the experience and the information pertaining to the science of engineering and to the art of transportation have been somewhat disregarded. It has been assumed that so long as the gross earnings are maintained or increased, the standard *pro rata* of expenses to earnings should not only be maintained but even diminished, and that the cost of the service should be reduced with the reduction in the rate charged for it. The efforts to take away each other's business have been pursued with such zeal and ingenuity that the surplus revenue can no longer furnish the means for improvement nor for liberal operation except by a



reduction of the dividend fund. The matter of pressing moment is to eke out the dividend from the fund set apart for operating expenses, and it has therefore seemed to me that a timely topic for my address to-day would be the reduction of expenses in railroad operation.

In discussing the reduction of expenses we must keep in view the distinction between the expenditures made for performing the service of transportation and for maintaining the property in present condition, that is the ordinary expense account, and those made for the purpose of improving the condition of the property or for increasing its capacity to perform the service of transportation, that is the extraordinary expense or improvement account. The responsibility of the railroad manager is different with respect to these two classes of expenses. He is not bound to give the public improved service at the expense of his stockholders, though it is plainly his duty to give safe service. He must not seek economy at the expense of safety. To a certain extent he can economize with a decrease in traffic by a diminution in the number of trains, and the expenditure for freight handling may be somewhat reduced with decreased tonnage, though the expenses which fluctuate with train mileage and with tonnage constitute a relatively small portion of the total operating expenses, and outside of train service and freight handling the general service can be but little diminished with the diminution of traffic in a period of temporary depression. But when the same tonnage is handled at reduced rates the same work must be done, that is, if the road is ordinarily operated with due regard for economy; but less money must be paid for doing it. When it comes to doing the same work for less money, the reduction must be made by paying less for men or materials, or for both. This reduction will at first be made in quantity as far as that is practicable. You will reduce your force and your stock of supplies. But when the minimum has been

reached, below which the standard of efficiency would be impaired, then any further reductions must affect the pay of the men and the prices of the supplies. Naturally, we leave the wages until the last, and seek to bear down the cost of the supplies. This cannot be carried very far without affecting their quality, and it is a matter which comes of long experience and of intimate acquaintance with their manufacture to be able to determine whether the reduction in prices has not been attained by such a reduction in quality as substantially to make the lower priced article dearer than that for which a higher price is asked.

But, when you have reached your limit in reducing your force and in cheapening your supplies, you have but one other direction in which to seek still further economy, and that is in a reduction of wages. How will you do it? Will you insist upon a horizontal reduction of so much percent.? Or will you make the percentage of reduction decrease with the rate of pay? Every step that you take will meet with opposition from those that are to be hurt by it, and where such opposition can be strongly organized you will be tempted to ease up in that direction and to lay a heavier load on those who cannot offer so much resistance.

The principal considerations then in an enforced reduction of expenses are to determine the extent to which such a reduction can be applied as between men and materials, and the fairest way of applying a reduction to men's wages.

About two thirds of the ordinary operating expense account go to salaries and wages, the remaining third is applied to supplies, implements and all other items which may be briefly termed materials. I will endeavor to illustrate by an example the effect of such a reduction on a road 500 miles long with gross earnings of \$6,000 per mile, which is perhaps an average example of the length and earnings of a railroad in this country, and will assume that such a road would ordinarily be operated with

economy at 66 per cent. of the gross earnings. We would then have a road with

|                             |                    |
|-----------------------------|--------------------|
| Gross earnings, say of..... | \$3,000,000        |
| Operating expenses.....     | 2,000,000          |
| Surplus... ..               | <u>\$1,000,000</u> |

Now with gross earnings reduced 10 per cent., or \$300,000, the manager would be expected still to operate it for 66 per cent, which would be as follows:

|                              |                  |
|------------------------------|------------------|
| Gross earnings, say.....     | \$2,700,000      |
| Operating expenses, say..... | 1,800,000        |
| Surplus.....                 | <u>\$900,000</u> |

This would be a uniform decrease of 10 per cent. in gross earnings in the fund for operations, and in that fund also from which fixed charges and dividends are to be paid.

The manager would then have to decide how to reduce his expense account from \$2,000,000 to \$1,800,000. As wages constitute about two thirds of the total cost of operation, two thirds of the reduction should be made from wages, and the other third from what I have termed materials. The division of this 10 per cent. reduction would then be as follows :

|                             |                                   |
|-----------------------------|-----------------------------------|
| Wages reduced from .....    | \$1,334,000 to \$1,200,000        |
| Materials, etc., from ..... | 666,000 to 600,000                |
| Total, from.....            | <u>\$2,000,000 to \$1,800,000</u> |

But if you will classify the items which are not wages you will find that some of them you cannot reduce, because they are not under your control. For example : there are legal expenses, insurance, injury to persons and property, bridge material, cross-ties, rails, frogs and switches, fuel, car mileage balances, loss and damage to freight, and other items which will also occur to you. But considering only those which I have enumerated, one fourth of the total cost of operations is for items that you cannot touch, and the reduction of 10 per cent. in

the total cost of operations must fall upon 75 per cent. of that total, which means a reduction of over 13 per cent. in wages and in other items, the cost of which can be controlled by the management. The total reduction in each department will vary with the varying percentage of uncontrollable items that are charged to that department.

In referring to these departments I classify them as follows :

Administrative department, including so-called general expenses and expenses of purchasing agencies.

Roadway department, including all expenses pertaining to maintenance of way and structures.

Machinery department, including maintenance of motive power and rolling stock, also fuel and wages of locomotive crews.

Transportation department, including wages of train men.

Freight and passenger department, including all station agents, clerks and laborers employed in billing and handling freight and passengers.

The total expense account of \$2,000,000 would be divided among these several departments about as follows :

|  |                          |
|--|--------------------------|
| Administrative department. ....        | \$180,000 or 9 per cent. |
| Roadway department. ....               | 400,000 " 20 "           |
| Machinery department. ....             | 740,000 " 37 "           |
| Transportation department. ....        | 300,000 " 15 "           |
| Freight and passenger department. .... | 380,000 " 19 "           |

|             |             |
|-------------|-------------|
| Total. .... | \$2,000,000 |
|-------------|-------------|

The percentage of total expenses in each department which goes for wages varies materially and is about as follows :

|   |              |
|---|--------------|
| In administrative department. ....        | 28 per cent. |
| In roadway department. ....               | 55 "         |
| In machinery department. ....             | 59 "         |
| In transportation department. ....        | 75 "         |
| In freight and passenger department. .... | 89 "         |

Any uniform reduction in pay will therefore affect each department very differently. For instance, 89 per cent.

of the total cost of operating the freight and passenger departments would be affected, while in the administrative department only 28 per cent. would be affected.

On this basis the total reduction of \$2,000,000 would be borne in each department as follows :

| Reduction.                         | In wages. | In other items. | Total.    |
|------------------------------------|-----------|-----------------|-----------|
| Administrative department .....    | \$5,000   | \$5,000         | \$10,000  |
| Roadway department .....           | 30,000    | 3,000           | 33,000    |
| Machinery department .....         | 60,000    | 15,000          | 75,000    |
| Transportation department.....     | 30,000    | 3,000           | 33,000    |
| Freight and passenger department.. | 45,000    | 4,000           | 49,000    |
| Totals.....                        | \$170,000 | \$30,000        | \$200,000 |

On such a road as I have used for an illustration, out of a total expense account of \$2,000,000, about \$1,270,000 would go for salaries and wages, and of this amount about \$410,000 would be paid to enginemen, firemen, trainmen, switchmen and telegraph operators. Where these classes of employees are protected against reduction of wages by contract, the total reduction must fall upon those classes which are not so organized, and whose wages would amount in all to about two thirds of the pay roll account. Under such conditions the result of an apparent reduction of ten per cent. in total expenses would be to reduce by twenty per cent. the salaries and wages of all officials and employees whose pay was not fixed by contract.

It is a matter for traffic officials to ponder upon, when they are cutting rates to take away each other's business, that the reductions in gross earnings thereby occasioned must be made good from operating expense account.

In the case which I have worked out as an illustration, if a reduction of 30 cents per ton had been made on a considerable volume of traffic, coal, for instance, 10 cents would have come out of the fund available for fixed charges and dividends, 3 cents out of the vouchers paid supply men, &c., and 17 cents out of salaries and wages, that is, if the reduction was uniformly distributed.

Is there no way to stop this continuous shrinkage of

rates on competitive traffic? It is the most serious problem which confronts the railroad managements of this country at the present time. The total volume of this business is not increased by such reductions, though the total revenue derived from it is proportionately diminished, however the total loss may be distributed among the competitors. It is not possible, from available statistics, to separate the tonnage and revenue of competitive and local traffic. The totals are given in the Inter-State Commerce Commission report for 1892 as, in round numbers, 88,000 million ton miles and 799 million dollars. The total common stock is given at 3,978 million dollars, and the total dividends on common stock at 79 million dollars, an average dividend of two per cent. Over 70 per cent. of the total common stock received no dividend whatever. An increase of one mill per ton mile on the total tonnage in 1892 would have resulted in increased net earnings of 88 million dollars which, if added to the total amount paid in dividends on common stock, would have raised the average dividend from 2 to 4 per cent. What possibilities there would be in such improved earnings for better service, for greater facilities, for higher wages, for increased sale of supplies, for a general advance in the value of railroad securities, and indeed for brighter prospects in every field of industry in this country of ours, where the railroad is so important a factor.

But why present such a picture to the railroad manager whose daily task is to make yet another turn of the screw on operating expenses; a vision of that which is as impossible as it is attractive. And why is it impossible? Why is it that authority should be given to traffic officials arbitrarily to reduce rates regardless of the cost of performing the service? Because the men who are responsible for gross earnings are responsible for nothing else. They have gone on from year to year, each striving to snatch as much as he could from the common reservoir of traffic, and the swelling tide of the nation's prosperity

kept the bowl ever full and overflowing. The contest in which each sought to get the largest share became so exciting that all other considerations were set aside, not only considerations of cost and value of service performed but even of good faith, and I may say of common honesty. In what an off-hand manner five cents would be taken off a rate of twenty-five cents per hundred pounds for a thousand mile haul. Yet the rate of twenty-five cents was only half a cent per ton mile, and the cut of five cents was a reduction of 20 per cent. in the total rate. And I have known such sweeping reductions to be made in a vaunting way, on the spur of the moment and in a spirit of resentment because of some offensive action by a competitor.

The time has arrived in the development of this country's resources and of its railroad system, when such a policy in the management of competitive traffic cannot be persisted in without disastrous consequences. The increase in the volume of such traffic is proportionately less year by year; the bowl is no longer overflowing. But the competitors are increasing; year by year others are tapping the reservoir. Either the volume of tonnage must increase more rapidly than the rate diminishes or the total revenue from competitive traffic must decrease. That is just what is taking place, and the shortage must be made good by reduction in operating expenses.

As I have just asked, is there to be no end to this shrinkage of rates? Will it avail anything without traffic officials to impress upon them the fact that the point has been reached at which each further step in economy means another step in the reduction of wages? I believe that it will; that the men who display so much intelligence in outwitting each other to get business are competent to recognize that there is a point below which the rate is less than the cost of the service, and that when that point is reached they can in no way more successfully get the

best of a competitor than by forcing him to take the business.

But how can that point be ascertained? Not by figuring out the average rate per ton mile. The statistician who devised that standard of performance is responsible for most of the ills which railroad properties have suffered. It is so easy to make the calculation, once the total ton mileage and the total revenue are known, that it has been made the basis of comparison by Wall Street brokers, grangers, demagogues, legislators, by all who had a moral to enforce or a tale to tell at the expense of some unfortunate railroad management or corporation. It serves no practical purpose. It has no actual existence. It is a mere figment of the brain. Yet it is the father and the mother of the long and the short haul idea; it is the standard for operating expenses, and it is the only yardstick that is put in the hands of the traffic official when he is measuring off competitive traffic. No better service could be done for our railroads than to demonstrate its inefficiency, its utter nothingness; to dissolve the phantom into the thin air whence it came. We move freight by car loads, not by tons, and it is by car miles and not by ton miles that the cost of the service should be reckoned. Add to this standard the cost of terminal service and you will give the traffic official the means of ascertaining the dividing line between profit and loss in making rates on competitive traffic. And you will have a standard by which the work of the operating official can be fairly measured, also one which may be used to demonstrate to the local shipper that he is not the patient ass which is carrying the long haul shipper on his back. I feel sure that the more you think of it—you on whom falls the duty of reducing expenses as the rates are reduced, you will see how important it is that the cost and value of the service that you are responsible for should be measured by this rational standard rather than by one which helps no one and proves nothing—a standard which, if intelli-



gently used by the traffic official, will deter him from reducing rates at the expense of wages, and will assure a profitable revenue from the entire volume of competitive traffic ; a standard which will account for the aid rendered by heavier locomotives, lighter grades and curves, and every other improvement which cheapens the service and makes up the sum of possible economies in railroad operation.

To the traffic officials the stockholders must now look for relief. The prosperity of their property is no longer in the hands of the operating officials. Human ingenuity seems to have about done its utmost to give cheap transportation by rail. Every available invention has been adapted to that purpose, and if the limit of economic results has not yet been attained, it has been so nearly reached that the small percentage yet to be saved can only be gained by painful methods more characteristic of a country and of an industry tending to decay than of a great people full of energy and resource and of the greatest factor in modern civilization.

## RATES OF TRANSPORTATION AND COST OF SERVICE ON AMERICAN RAILROADS.

(April 17, 1895, at Planters' Hotel, St. Louis, Mo.)

The most serious fact which confronts the railroad managements of this country is the continuing reduction in the margin between the charge for transportation and the cost of performing the service. The annual approximation of these two lines of figures, as we look along them toward the horizon before us, is not a perspective illusion but an actual drawing together toward zero. We have postponed the critical moment at which they will meet in the vanishing point, by economies, true and false ; by a more enlightened use of the facilities at our command, and by requiring more work for less pay. But strive as we may between the conditions which confine our path on the one hand and on the other, cost and compensation, they cannot be kept parallel by changing the direction of one so long as the other changes at a greater angle ; in other words, so long as the pay for doing the work decreases faster than the cost of doing it can be decreased. Having made this assertion, let me proceed to substantiate it, relying for statistics upon the annual reports of the Inter-State Commerce Commission.

And first as to freight business. Look at the annual average revenue and cost per ton mile from 1888 to 1893, and the difference between them. For purposes of comparison, some approximate figures are also given from advance reports for 1894 :

### CENTS PER TON MILE.

|            | Revenue. | Cost. | Profit. |
|------------|----------|-------|---------|
| 1888.....  | 1.001    | .630  | .371    |
| 1889.....  | .922     | .593  | .329    |
| 1890.....  | .941     | .604  | .337    |
| 1891.....  | .895     | .583  | .312    |
| 1892.....  | .898     | .582  | .316    |
| 1893... .. | .878     | .579  | .299    |
| 1894.....  | .866     |       |         |

## ANNUAL DECREASE.—CENTS PER TON MILE.

|                | Revenue. | Cost.     | Profit.   |
|----------------|----------|-----------|-----------|
| 1889.....      | .079     | .037      | .042      |
| 1890..... Inc. | .019     | Inc. .011 | Inc. .008 |
| 1891 .....     | .046     | .021      | .025      |
| 1892..... Inc. | .003     | .001      | Inc. .004 |
| 1893.....      | .020     | .003      | .017      |
| 1894.....      | .012     |           |           |

The reduction in cost since 1891 has been so minute as to indicate that the minimum cost of performing the service has been substantially reached, at least until some considerable aid to further economy shall have been discovered or invented. Now compare the total reduction in six years, from 1888 to 1893.

## TOTAL DECREASE.—CENTS PER TON MILE.

|              | 1888. | 1893. | Decrease. | Per Cent. |
|--------------|-------|-------|-----------|-----------|
| Revenue..... | 1.001 | .878  | .123      | 12        |
| Cost ... ..  | .630  | .579  | .051      | 8         |
| Profit ..... | .371  | .299  | .072      | 19        |

In these six years we have not only given to the public the entire result of our economies and of our improved methods of operation, amounting to .051 cents per ton mile, but we have given them .072 cents besides, an addition of nearly 150 per cent. over the decrease in cost. That it is about time to call a halt in this race toward zero is evident from the fact that while the cost decreased .047 cents from 1888 to 1891, it decreased but .004 cents from 1891 to 1893. There is a bright side to this dark picture, for which we are indebted to the bountiful resources providentially bestowed upon this favored land and to the industry and ingenuity of our people. This combination of resources and energy so increased the total volume of traffic in these six years as measurably to neutralize the loss of revenue which would otherwise have resulted from the lavish and irrational reduction in rates. As the statistics bearing upon this point are not given for 1888, the following statement begins with 1889 :

## ANNUAL FREIGHT TRAFFIC.

|                                     | Ton Miles.     | Increase.     | Per Cent. |
|-------------------------------------|----------------|---------------|-----------|
| 1889.....                           | 68,727,223,146 | .....         | ..        |
| 1890.....                           | 76,207,047,298 | 7,479,824,152 | 11        |
| 1891.....                           | 81,073,784,121 | 4,866,736,823 | 6         |
| 1892.....                           | 88,241,050,225 | 7,167,266,104 | 9         |
| 1893 .....                          | 93,588,111,833 | 5,347,061,608 | 6         |
| Average annual increase 8 per cent. |                |               |           |

But the preliminary report for 1894 reveals a change in the annual tonnage movement so remarkable as to menace our sublime reliance upon the continuing capacity of this favored land to force into the channels of transportation an ever increasing volume of business.

A comparison of these figures in this advance report with those given in the advance report for the previous year, results as follows :

|                                      |                |
|--------------------------------------|----------------|
| 1893—Ton miles on 149,559 miles..... | 84,968,987,747 |
| 1894—Ton miles on same roads.....    | 70,426,344,965 |
| Decrease (17 per cent.).....         | 14,542,642,782 |

Instead of the increase from year to year which the tonnage reports had shown since the Inter-State Commerce Commission had a being, we are for the first time confronted, not by a diminution in the flowing tide, but by a reversal in the current. The volume of business no longer rises in the reservoir of railroad traffic from which it is drawn by an increasing number of mains. It is ebbing from the high water mark, and the widening strand is covered with the wrecks which it has left as it receded. In one year it has substantially fallen to where it was five years before, nor is this the only disagreeable feature of the situation in which the railroad managements of this country now find themselves. Attention has already been called to the continuing decrease in the rate of compensation for freight service. We see that it has fallen .135 cents per ton mile, or 13 per cent. since 1888. During that time the cost has decreased but .051 cents or about 8 per cent., thus reducing the average profit on the

haul from .371 cents to about .287 cents ; a decrease of about 22 per cent.

So long as the volume of business per mile increased on an average about 6 per cent. per annum, this steady decrease in the profit on the haul was not shown in the total volume of earnings from freight traffic.

## ANNUAL FREIGHT EARNINGS.

|           | Gross Earnings. | Increase.    | Per Cent. |
|-----------|-----------------|--------------|-----------|
| 1889..... | \$633,664,997   | .....        | ..        |
| 1890..... | 717,108,315     | \$73,443,318 | 11        |
| 1891..... | 725,610,067     | 8,501,752    | 1.2       |
| 1892..... | 792,404,631     | 66,794,564   | 9         |
| 1893..... | 821,703,622     | 29,298,991   | 3.7       |

The average annual increase in total freight earnings has been about five per cent., while the average increase in the volume of traffic has been over eight per cent.

The irregularity in the rate of annual increase in earnings has been greater to a remarkable degree than in the rate of increase of traffic. This is due mainly to the fluctuation in the average rate. For instance, the increase of 11 per cent. in the freight earnings of 1890, accompanied an increase of .019 cents in the rate combined with an increase of 11 per cent. in traffic, while the slight increase in the earnings of the following year was due to a decrease of .046 cents in the rate with but 6 per cent. increase in traffic.

Still when the gross freight earnings for 1893 are compared with those for 1889, the increase is impressive. Not so much, however, when we compare these figures with the ton mileage, and with the net revenue.

But before making this comparison let us glance again at the advance report for 1894. The product of the ton-miles therein given by the rate gives the total earnings :

|                                    |                      |
|------------------------------------|----------------------|
| On that traffic as.....            | \$609,890,147        |
| And on the same roads in 1893..... | 746,027,712          |
| Decrease (18 per cent.).....       | <u>\$136,137,565</u> |

Now compare these figures with those for 1892 and 1893 :

INCREASE IN FREIGHT EARNINGS.

|                           |                   |           |
|---------------------------|-------------------|-----------|
| 1892 over 1891.....       | \$66,794,564 or 9 | per cent. |
| 1893 over 1892.....       | 29,298,991 " 3.7  | "         |
| Decrease, 1894 over 1893. | 136,137,565 " 18  | "         |

No comment is needed to call attention to the situation which these figures represent. Let us now return to the situation in 1893, as compared with that in 1889 :

|               | Ton Mileage.   | Freight Earnings. |
|---------------|----------------|-------------------|
| 1889.....     | 68,727,223,146 | \$633,664,997     |
| 1893.....     | 93,588,111,833 | 821,703,622       |
| Increase..... | 24,860,888,687 | \$188,038,625     |
| Per cent..... | 34             | 30                |

In these five years the increase in the gross freight earnings did not keep pace with the ton mileage, which is due to the decrease in the rate, yet the result would have been quite satisfactory if the net earnings had shown as well.

The annual net earnings during the same years were as follows :

|           | Net Freight Earnings. | Increase.    | Per Cent.  |
|-----------|-----------------------|--------------|------------|
| 1889..... | \$226,112,564         | .....        | ....       |
| 1890..... | 256,817,749           | \$30,705,185 | 14         |
| 1891..... | 252,950,206 (dec.)    | 3,867,543    | 1.5 (dec.) |
| 1892..... | 278,841,718           | 25,891,512   | 10         |
| 1893..... | 279,828,454           | 986,736      | 0.3        |

The average annual increase in net earnings from freight traffic during these five years was about  $4\frac{1}{2}$  per cent., but the fluctuations from year to year have been so great as to emphasize the lesson which I have sought to enforce upon the minds of railroad managers ; that is, that the compensation for the service should bear a due relation to the cost of performance. This is clearly shown by the following statement, in which the percentage of increase or decrease in ton mileage, gross and net earnings, are brought together :

|            | Ton Miles.<br>Increase. | Gross Freight Earnings.<br>Increase. | Net Freight Earnings.<br>Increase. |
|------------|-------------------------|--------------------------------------|------------------------------------|
| 1889.....  | ..                      | ..                                   | ..                                 |
| 1890... .. | 11 per cent.            | 13 per cent.                         | 14 per cent.                       |
| 1891.....  | 6 "                     | 1.2 "                                | 1.5 " (dec.)                       |
| 1892.....  | 9 "                     | 9 "                                  | 10 "                               |
| 1893.....  | 6 "                     | 3.7 "                                | 0.3 "                              |

Such results as are shown in 1891, when an increase of 6 per cent. in ton mileage resulted in a decrease of 1.5 per cent. in net revenue, and in 1893, when 6 per cent. increase in ton mileage resulted in only 0.3 per cent. increase in net revenue, are indeed anomalous as compared with the results in the alternate years. But they can be readily understood by reference to the comparison of annual increase and decrease in the rate, cost and net receipts per ton mile, given above. In 1890 the net earnings per ton mile increased .008 cents, and in 1892 .004 cents, over the previous year, while in 1891 there was a decrease of .025 cents, and in 1893 of .017 cents, over the previous years. That such minute variations in the rate per ton mile should so seriously affect the total result ought to be remembered by traffic managers when they are tempted to cut rates ten or twenty per cent. in order to compete for the favors of a large shipper.

There is another lesson to be learned from these figures. It would seem that after maintaining rates very well in 1890, the traffic managers went wild in the following year and reduced rates .046 cents per ton mile. A pressure was brought to bear on the operating managements, which led to their reducing the cost .021 cents, so that the decrease in the net was but .025 cents. In the following year, 1892, the traffic managers maintained rates at the low level reached the previous year and indeed slightly increased them by .003 cents ; the operating managements also made a slight decrease, and the net result was an increase of .004 cents. Small as this was it led to an increase of 10 per cent. or nearly \$26,000,000 in net freight earnings in 1892 over the previous year. The following year rates were again cut .020 cents ; the operating

managements responded by a reduction of .003 cents in the cost, but the net rate fell off .017 cents; the result being, that with an increase in ton-mileage of over 5,000 million miles the net earnings showed an increase of less than a million dollars, against an increase of nearly \$26,000,000 in the net earnings of 1892. So far as it is practicable to extend this investigation into the operations of 1894, as obtained from the preliminary report for that year, the following results are obtained :

|               | Ton Mileage.   | Freight Earnings. |
|---------------|----------------|-------------------|
| 1893 .....    | 84,968,987.747 | \$746,027,712     |
| 1894.....     | 70,426,844,965 | 609,890,147       |
|               | <hr/>          | <hr/>             |
| Decrease..... | 14,542,642,782 | \$136,137,565     |
| Per cent..... | 17             | 18                |

These figures are based upon 149,559 miles of the same roads in 1894 as in 1893, being about 24,000 miles less than the total mileage of 1894.

The rate per ton-mile in 1893 was..... .878 cents  
 And the cost per ton-mile was..... .579 "

Net revenue per ton-mile..... .299 cents

The rate per ton-mile in 1894 was..... .866 cents  
 Assuming the cost per ton-mile, which is not given, as the  
 same as in 1893, viz..... .579 "

Net revenue per ton-mile..... .287 cents

Applying this net revenue per ton mile to the ton mileage as above given, the results obtained as to total net earnings are as follows :

|                                 |               |
|---------------------------------|---------------|
| Net freight earnings 1893 ..... | \$253,617,273 |
| Net freight earnings 1894 ..... | 202,123,610   |
|                                 | <hr/>         |
| Decrease (20 per cent.).....    | \$51,493,663  |

Thus it is seen that on the same 149,559 miles compared in these two years there was a decrease in 1894 of 17 per cent. in the volume of freight traffic, and of 18 per



cent. in the gross and of 20 per cent. in the net income therefrom as compared with 1893.

In the report it is estimated that 15 per cent. should be added to the figures for 1894, to ascertain the true volume of traffic for the entire mileage operated during that year. On this basis, the net freight earnings on

|  |               |
|--|---------------|
| The entire mileage in 1894 would be.....         | \$232,470,000 |
| And in 1893 on the entire mileage they were..... | 279,828,454   |

|  |              |
|--|--------------|
| Estimated decrease (17 per cent.)..... | \$47,358,454 |
|--|--------------|

Compare now the changes in net earnings from freight traffic on the entire mileage of the country for the past three years :

|       |                     |              |              |
|-------|---------------------|--------------|--------------|
| 1892. | Increase.....       | \$25,891,512 | 10 per cent. |
| 1893  | Increase.....       | 986,736      | 03 "         |
| 1894. | Estimated decrease. | 47,358,454   | 17 "         |

Surely it is not an incorrect figure of speech to say that the tide which has been flowing without change for all these years has been suddenly reversed ; that, as if from some great catastrophe, the stream is flowing toward its source.

But why dwell on these figures ? To seek by reiteration to impress upon the minds of those who are responsible for the management of the railroads in this country, that farther reduction in freight rates must cease if net earnings are to be maintained. The statistics for 1892 and 1893 showed that it was not possible to extend favors of this kind any longer to the public without still farther reduction in the wages of railroad employees. The figures now given for 1894 manifest such a decrease in the volume of traffic as to indicate that even at present rates such a reduction is imminent unless some great discovery shall render it possible to bring about a decrease in other items of expense, such as for instance followed upon the production of Bessemer steel.

Railroad stockholders and bondholders should entirely oppose further reductions in freight rates. That their

interests will be seriously and unfavorably affected unless this be stopped may readily be shown.

The traffic statistics of the Inter-State Commerce Commission here referred to are based upon the following road mileage, which is less than the actual mileage of the country :

|                 |         |                      |             |
|-----------------|---------|----------------------|-------------|
| In 1889..       | 153,885 |                      |             |
| In 1893..       | 169,779 | Increase over 1889.. | 9 per cent. |
| In 1894..(est.) | 173,000 | Increase over 1893.. | 2    “      |

Let us see to what extent the increase in freight traffic and freight earnings has justified the increased road mileage as given above, using for this purpose a comparison per mile of road.

| Per Mile.                | 1889.   | 1893.   | 1894 (est.) |
|--------------------------|---------|---------|-------------|
| Ton mileage.....         | 448,069 | 551,232 | 468,200     |
| Gross freight earnings.. | \$4,131 | \$4,840 | \$4,054     |
| Net freight earnings.... | 1,474   | 1,648   | 1,343       |

From this comparison it would seem that from 1889 to 1893 the amount of traffic and the net returns more than kept pace with the increased road mileage. But we must consider that the ratio of net revenue has been maintained by economies which cannot be materially augmented unless relief can be obtained from some new source. Those who are responsible for the cost of operation should insist that there shall be no further reduction in rates. The estimated results for 1894 re-enforce this demand—for they show that the results for that year are worse than for any year since these statistics have been compiled.

The relation of net earnings to capital invested in railroad property has an important bearing on this matter of freight rates. When we compare the investment in 1889 and 1893 we find the following results :

|             | Stock.          | Bonds.          | Total.          |
|-------------|-----------------|-----------------|-----------------|
| 1889.....   | \$4,251,190,719 | \$4,267,527,859 | \$8,518,718,578 |
| 1893.....   | 4,630,457,481   | 5,266,318,961   | 9,896,776,442   |
| Increase... | \$379,266,762   | \$998,791,102   | \$1,378,057,864 |
| Per Cent .. | 8.9             | 23.4            | 16.2            |

## INVESTMENT PER MILE OF ROAD.

|                | Stock    | Bonds.   | Total.   |
|----------------|----------|----------|----------|
| 1889.....      | \$27,716 | \$27,822 | \$55,538 |
| 1893.....      | 28,714   | 32,657   | 61,371   |
| Increase... .. | \$998    | \$4,835  | \$5,833  |

The net freight earnings per mile of road amounted in 1889 to 2.6 per cent. on the total investment and to 2.7 per cent. in 1893. And if applied only to the bonded debt they would have paid 5.3 per cent. in 1889 and 5.1 per cent. in 1893.

Leaving for the present the subject of freight traffic, a somewhat similar analysis is here presented of the passenger traffic for the same period.

## CENTS PER PASSENGER MILE.

|           | Revenue. | Cost. | Net. |
|-----------|----------|-------|------|
| 1889..... | 2.165    | 1.993 | .172 |
| 1890..... | 2.167    | 1.917 | .250 |
| 1891..... | 2.142    | 1.910 | .232 |
| 1892..... | 2.126    | 1.939 | .187 |
| 1893..... | 2.108    | 1.955 | .153 |
| 1894..... | 1.976    |       |      |

The changes in these figures from year to year have been as follows :

## CENTS PER PASSENGER MILE.

|           | Revenue.  | Cost.     | Net.      |
|-----------|-----------|-----------|-----------|
| 1890..... | Inc. .002 | Dec. .076 | Inc. .078 |
| 1891..... | Dec. .025 | " .007    | Dec. .018 |
| 1892..... | " .016    | Inc. .029 | " .045    |
| 1893..... | " .018    | " .016    | " .034    |
| 1894..... | " .132    |           |           |

The slight increase in gross revenue in 1890 was succeeded by a uniform decrease in the following years until the great decrease in 1894, the Columbian Exhibition year. The remarkable decrease in cost in 1890 was followed by a further slight decrease in 1891, and by a considerable increase in each of the following years. The effect of these fluctuations has been a continuing decrease in the annual net rate,

Comparing 1889 with 1893 the resulting changes have been :

| CENTS PER PASSENGER MILE. |              |              |              |           |
|---------------------------|--------------|--------------|--------------|-----------|
|                           | 1889.        | 1893.        | Dec.         | Per Cent. |
| Revenue.....              | 2.165        | 2.108        | 0.057        | 2         |
| Cost.....                 | 1.993        | 1.955        | 0.038        | 2         |
| Net .....                 | <u>0.172</u> | <u>0.153</u> | <u>0.019</u> | <u>10</u> |

Here again, as with the freight rate, more has been given away than has been saved in cost, for while the rate has been reduced .057 cents per mile, the reduction in cost has been but .038 cents per mile ; a gift to the traveling public of .019 cents per mile more than the saving in cost.

Now if we compare the percentage of reduction in these five years in the rate and cost per mile in passenger traffic, with the rate and cost per ton mile in freight traffic, the relative reduction is seen to be as follows :

|                               | Reduction in | Rate.     | Cost.       |
|-------------------------------|--------------|-----------|-------------|
| Freight per ton mile.....     | 12           | per cent. | 8 per cent. |
| Passengers per passenger mile | 2            | "         | 2 "         |

These figures show that the rates on passenger traffic have been much better maintained than on freight traffic, while the cost of the service in the former has been by no means so greatly reduced as in the latter.

Let us now compare the annual changes in the volume of passenger traffic :

| ANNUAL PASSENGER TRAFFIC.              |                  |             |           |
|--|------------------|-------------|-----------|
|  | Passenger Miles. | Increase.   | Per Cent. |
| 1889 .. . . . .                        | 11,553,820,445   | .....       | ..        |
| 1890 .. . . . .                        | 11,847,785,617   | 293,965,172 | 2.5       |
| 1891 .. . . . .                        | 12,844,243,881   | 996,458,264 | 8.4       |
| 1892 .. . . . .                        | 13,362,898,299   | 518,654,418 | 4.        |
| 1893 .. . . . .                        | 14,229,101,084   | 866,202,785 | 6.4       |
| Average annual increase, 5.3 per cent. |                  |             |           |

The preliminary report for 1894 affords the following comparison with the figures for 1893 :

|                                      |                                   |                   |
|--------------------------------------|-----------------------------------|-------------------|
| 1894.                                | Passenger miles on 149,559 miles. | 12,899,936,578    |
| 1893.                                | Passenger miles on same roads..   | 12,873,272,594    |
| Increase (.2 of one per cent.),..... |                                   | <u>26,663,984</u> |

This result is indeed disappointing, since its includes in 1894 the travel due to the Columbian Exhibition.

## ANNUAL PASSENGER EARNINGS.

|           | Gross Earnings. | Increase.   | Per Cent. |
|-----------|-----------------|-------------|-----------|
| 1889..... | \$250,140,212   | .....       | ...       |
| 1890..... | 256,741,514     | \$6,601,302 | 2.6       |
| 1891..... | 275,123,703     | 18,382,189  | 7.1       |
| 1892..... | 284,095,217     | 8,971,514   | 3.2       |
| 1893..... | 299,949,450     | 15,854,233  | 5.5       |

The average annual increase in gross passenger earnings has been 4.6 per cent. against an increase of 5.3 per cent. in the volume of traffic.

An irregularity in the rate of annual increase of earnings is to be observed as in the case of gross freight earnings :

## AVERAGE ANNUAL INCREASE IN GROSS FREIGHT AND PASSENGER EARNINGS.

|            | Freight Earnings.    | Passenger Earnings. |
|------------|----------------------|---------------------|
| 1890.....  | Increase 8 per cent. | 2.6 per cent        |
| 1891 ..... | " 1.2 "              | 7.1 "               |
| 1892.....  | " 9 "                | 3.2 "               |
| 1893.....  | " 3.7 "              | 5.5 "               |

The heavy increase in both freight and passenger earnings occurred in alternate years, but as between the two it did not fall in the same years.

On the figures in the preliminary report for 1894 the gross earnings on the mileage therein reported amounted to \$254,902,746 ; and on same mileage in 1893, \$271,368,586 ; decrease (6 per cent.), \$16,465,840.

Here again, as with the freight traffic, an actual decrease is shown for the first time in the Inter-State Commerce Commission Reports, and that, too, in the Columbian Exposition year !

The total increase in passenger traffic and gross earnings from 1889 to 1893 was as follows :

|               | Passenger Miles. | Gross Earnings. |
|---------------|------------------|-----------------|
| 1889.....     | 11,553,820,445   | \$250,140,212   |
| 1893....      | 14,229,101,084   | 299,949,450     |
| Increase..... | 2,675,280,639    | \$49,809,238    |
| Per Cent..... | 23               | 20              |

The annual net passenger earnings in each of these five years were as follows :

|           | Net Earnings.     | Increase.        | Per Cent. |
|-----------|-------------------|------------------|-----------|
| 1889..... | \$19,872,571      | .....            | ...       |
| 1890..... | 29,619,640        | \$9,747,069      | 4.9       |
| 1891..... | 29,798,645        | 179,005          | 0.6       |
| 1892..... | 24,988,619 (dec.) | 4,810,026 (dec.) | 16.1      |
| 1893..... | 21,770,524 (dec.) | 3,218,095 (dec.) | 12.9      |

The net earnings in 1893 were about \$8,000,000 less than in 1891, and but 2,000,000 more than in 1889, although the gross earnings were 20 per cent. greater.

So far as we may draw an inference from the preliminary report for 1894 we may estimate the net passenger earnings for that year about as follows : On the road mileage reported there was an increase of .2 of one per cent. in passenger traffic over the preceding year. With the average rate per passenger mile as stated the resulting gross earnings on that traffic showed a decrease of about 6 per cent.

The average rate per mile was given at..... 1.976 cents  
 In 1893 the average cost per mile was..... 1.955 "

On this basis the net rate per mile would be .021 cents

The road mileage reported was said to be about 86 per cent. of the total, and on this basis the total net earnings from passage in this country in 1894 may be estimated not to exceed \$3,150,000, as against \$21,000,000 in 1893. Of course, if the average cost per passenger mile for performing the service has been diminished in 1894, then this estimate of net earnings is too low, but there is nothing in the statistics of the past six years to lead us to hope for any better result.

The causes of this discouraging exhibit are indicated in the following comparison of the percentages of increase or decrease annually in passenger mileage and in gross and net passenger earnings :

|          | Passenger Miles.<br>Increase. | Gross Earnings.<br>Increase. | Net Earnings.<br>Increase. |
|----------|-------------------------------|------------------------------|----------------------------|
| 1889.... | ...                           | ...                          | ...                        |
| 1890.... | 2.5 per cent.                 | 2.6 per cent.                | 4.9 per cent.              |
| 1891.... | 8.4    "                      | 7.1    "                     | 0.6    "                   |
| 1892.... | 4.0    "                      | 3.2    " (dec.)              | 16.1   "                   |
| 1893.... | 6.4    "                      | 5.5    " (dec.)              | 12.9   "                   |

Although the annual increase in gross earnings nearly kept pace with the increase in passenger mileage, the net earnings went to pieces because the cost of performance, so far from being reduced proportionately to the decrease in the rate, actually showed an increase.

## AVERAGE COST PER PASSENGER MILE IN CENTS.

| 1889. | 1890. | 1891. | 1892. | 1893. |
|-------|-------|-------|-------|-------|
| 1.993 | 1.917 | 1.910 | 1.939 | 1.955 |

A reduction of .083 cents from 1889 to 1891 was followed by an increase of .045 cents from 1891 to 1893, leaving the cost in 1893 but .038 cents less than in 1889, though the rate per mile had been reduced .057 cents during that period.

These apparently minute changes are more impressive when applied to the total volume of traffic. I therefore compare the traffic of 1893 with that of 1891, in which year the largest net earnings were reported from passenger traffic during the period under consideration.

|        | Passenger Miles. | Gross Earnings. | Cost.         | Net.             |
|--------|------------------|-----------------|---------------|------------------|
| 1891.. | 12,844,243,881   | \$275,123,703   | \$245,325,058 | \$29,798,645     |
| 1893.. | 14,229,101,084   | 299,949,450     | 278,178,926   | 21,770,524       |
| Inc... | 1,384,857,203    | \$24,825,747    | \$32,853,868  | Dec. \$8,028,121 |

It took 82 per cent. of the gross earnings from passenger traffic to perform the service in 1891, and 90 per cent. in 1893, although the gross earnings were 9 per cent. more in the latter than in the former year.

The operating managements have been apparently unable to do for the passenger service what they did for the freight service; that is, to reduce the cost somewhat as the rate was reduced. For this I shall offer an explanation

hereafter, but will first call attention to the relation which the passenger traffic in this country bears to the road mileage and to the capital invested in railroad property.

## PASSENGER TRAFFIC PER MILE OF ROAD.

|                           | 1889.   | 1893.   | 1894 (est.). |
|---------------------------|---------|---------|--------------|
| Passenger miles.. . . . . | 75,325  | 83,809  | 85,751       |
| Gross earnings . . . . .  | \$1,630 | \$1,766 | \$1,694      |
| Net earnings.....         | 129     | 128     | 18           |

The net passenger revenue per mile of road amounted in 1889 to .23 of one per cent. on the capital invested, and in 1893 to .20 of one per cent. As estimated for 1894, it was too small to be considered.

The relative contribution per mile of road as made respectively by the gross and net earnings from freight and passenger business in 1893, was as follows :

|                 | Gross.  | Net.    | Gross.       | Net.         |
|-----------------|---------|---------|--------------|--------------|
| Freight . . . . | \$4,656 | \$1,535 | 73 per cent. | 93 per cent. |
| Passenger ..    | 1,699   | 129     | 27 "         | " "          |
| Total..         | \$6,355 | \$1,714 |              |              |

According to these statistics, the proportionate contribution to net revenue from passenger traffic scarcely deserves attention, and when the total earnings are given the comparison is yet more impressive.

## TOTAL EARNINGS FROM FREIGHT AND PASSENGER TRAFFIC IN 1893.

|              | Gross.          | Per Cent. | Net.          | Per Cent. |
|--------------|-----------------|-----------|---------------|-----------|
| Freight. . . | \$821,703,622   | 73        | \$279,828,454 | 93        |
| Passenger.   | 299,949,450     | 27        | 21,770,524    | 7         |
| Total.       | \$1,121,653,072 |           | \$301,598,978 |           |

Having thus analyzed the traffic statistics of the railway system of this country for the past five years, let us now endeavor with these figures to assign to the respective managements of the traffic department and of the operating department the responsibility as to results.

First, as to freight traffic, we find the results to be as follows :



## CENTS PER TON MILE.

|                | Rate. | Cost. | Net.  |
|----------------|-------|-------|-------|
| 1889.....      | .922  | .593  | .329  |
| 1893.....      | .878  | .579  | .299  |
|                | <hr/> | <hr/> | <hr/> |
| Decrease ..... | .044  | .014  | .030  |

The question for the traffic managements to answer is whether they were justified in reducing the rates so much faster than the operating managements reduced the cost, as to reduce the net rate nearly ten per cent.

The question for the operating managements to answer is whether they could not have made a greater reduction than two or three per cent. in the cost of handling freight traffic in these five years.

The Inter-State Commerce Commission has given us figures intended to throw some light on this latter question.

From the "Comparative Summary of Expenditures and Analysis of Operating Expenses" for 1889 and 1893, I have taken the proportion indicated as chargeable to freight traffic and applied the ton-mile basis with the following results :

## COST IN CENTS PER TON MILE IN 1889 AND 1893.

|                             | 1889. | 1893. | Inc.  | Dec.  | Per Cent. |
|-----------------------------|-------|-------|-------|-------|-----------|
| Maintenance way .....       | .1374 | .1196 | ..... | .0178 | 13        |
| Maintenance equipment....   | .1007 | .0968 | ..... | .0039 | 4         |
| Conducting transportation . | .3139 | .3080 | ..... | .0059 | 2         |
| General expenses.....       | .0574 | .0583 | .0009 | ..... | 2         |
|                             | <hr/> | <hr/> | <hr/> | <hr/> | <hr/>     |
| Total.....                  | .6094 | .5827 |       | .0267 |           |
| As given in body of report. | .593  | .579  |       | .014  |           |
|                             | <hr/> | <hr/> | <hr/> | <hr/> | <hr/>     |
| Excess.....                 | .0164 | .0037 |       | .0127 |           |

It will be seen that the cost per ton mile as figured from the "Comparative Summary" is in both years in excess of the cost as stated in the body of the report, but this does not affect the value of the above comparison in seeking for the particular classes of expenditures in which the cost of performance has varied in the two years under consideration.

We see that the greater part of the reduction has been in maintenance of way, which fell off 13 per cent. This may be accounted for to a great extent by the substantially complete replacement of iron rail by steel.

The cost of conducting transportation, which constitutes over one half of the total cost per ton mile, shows but a slight reduction. This item includes the wages of trainmen, agents and freight handlers, the great body of railroad men proper. It is the item in which must be hereafter sought any considerable reduction in the cost of operation, and as materials and supplies enter very little into conducting transportation this means a reduction in wages. View this subject as we may, there is no escaping this conclusion ; if the present average cost per ton mile is too high, it can not be materially reduced except by a general reduction in the wages of men whose services are classified under the head of conducting transportation. It is also to be noted that only in the item of general expenses does the cost per ton mile show an absolute increase. Under the classification of expenses adopted by the Interstate Commerce Commission this item is apparently the residuum which remains after the other three items have been separated from the total cost of operations. It is therefore difficult to determine just what kind of expense it is that shows this disproportionate increase. It is true that the whole item of general expenses constitutes but about nine per cent. of the total cost per ton mile ; still, small as it is, it needs investigation.

There is very little in this analysis on which to base an accusation of extravagance against the operating managements in their handling of the freight traffic. It may be remarked, however, that the principal source of reduced cost in the past four years has been in maintenance of way, and if this be due to the general substitution of steel for iron rails there is but little further help to be expected in this direction.

Viewed in another way the operating managements do not escape unfavorable criticism as to handling freight traffic, that is, on the train mile basis.

## REVENUE AND COST PER FREIGHT TRAIN MILE.

|              | 1889.   | 1893.   |
|--------------|---------|---------|
| Revenue..... | \$1.653 | \$1.627 |
| Cost.....    | 1.064   | 1.067   |
| Net.....     | .589    | .560    |

It is rather a surprise to find after the introduction into general use of cars of twenty and even of thirty tons burthen and of locomotives of increased tractive power, that not only has the revenue per train mile decreased but that the cost has increased.

The probable cause is a still greater surprise, for when we seek to ascertain the average train load in 1889 we

|                                     |          |
|-------------------------------------|----------|
| find it was .....                   | 179 tons |
| And in 1893.....                    | 184 "    |
| Increase in average train load..... | 5 tons   |

That the average train load should not be more than about nine cars of twenty tons capacity and that all the investments in improved equipment in four years should yield no better results, is a matter which rests with the operating managements. Upon investigation it will be found that empty car mileage has much to do with it. Still with empty car mileage equal to the loaded mileage we can account for but eighteen cars in a train, which is much below the average train load possible with modern equipment. Another point to remark upon in passing is that the average haul has also decreased. In 1889 the average haul was 127.36 miles ; and in 1893, 125.6 miles.

We have now to make a similar analysis of the items of cost per passenger mile :

## COST IN CENTS PER PASSENGER MILE, 1889 AND 1893.

|                             | 1889. | 1893. | Inc.  | Dec.  | Per Cent. |
|-----------------------------|-------|-------|-------|-------|-----------|
| Maintenance way.....        | 0.438 | 0.403 | ..... | 0.035 | 8         |
| Maintenance equipment....   | 0.321 | 0.325 | 0.004 | ..... | 1         |
| Conducting transportation.. | 1.001 | 1.035 | 0.034 | ..... | 3         |
| General expenses.....       | 0.183 | 0.218 | 0.035 | ..... | 19        |
|                             | <hr/> | <hr/> |       |       |           |
| Total.....                  | 1.943 | 1.981 | 0.038 | ..... |           |
| As given in body of report. | 1.993 | 1.955 | ..... | 0.038 |           |
|                             | <hr/> | <hr/> | <hr/> | <hr/> | <hr/>     |
| Less.....                   | 0.050 |       |       |       |           |
| In excess.....              |       | 0.026 |       |       |           |

The figures in the body of the report show that the cost per passenger mile decreased .038 of a cent from 1889 to 1893, but the figures in the "Comparative Summary" show that the cost has increased just that amount during that period. This difference of .076 of a cent only affects the conclusions already reached as to the vanishing profit on passenger traffic by making the situation so much the worse. For the purpose now in view, viz., to ascertain in what class of operating expenses the cost per passenger mile has varied in this period of five years, we are compelled to use the analysis given in the "Comparative Summary," and to our surprise we find that in every item except in maintenance of way there has been a comparative increase—very slight in maintenance of equipment, but marked in conducting transportation and general expenses.

Permit me now to return to the opinions which I have already expressed as to the different tendencies of our traffic managements respecting freight and passenger business—viz., to reduce the rate per ton mile, but to maintain the rate per passenger mile. From the figures given with regard to the cost per passenger mile, we are led to the conclusion that the competition as to passenger traffic has taken the direction of better service, faster and more numerous trains, additional sleepers and dining cars.

The cost and revenue per passenger train mile are given as follows :

| PER TRAIN MILE. |            |            |           |           |
|-----------------|------------|------------|-----------|-----------|
|                 | 1889.      | 1893.      | Increase. | Decrease. |
| Revenue.....    | \$1.06.287 | \$1.06.819 | 0.00.532  | .....     |
| Cost.....       | .83.068    | .82.948    | .....     | 0.00.120  |
| Net.....        | .23.219    | .23.871    | 0.00.652  | .....     |

The average profit per passenger train mile has increased but .6 of one cent in five years, while the average number of passengers per train remain at 42 in 1893 as in 1889, and the average haul of each passenger has fallen from 24.47 miles to 23.79 miles.

The following comparative analysis of the proportion of expenses chargeable to passenger service is taken from the "Competitive Summary" on the train mile basis instead of the cost per passenger mile.

## COMPARATIVE COST PER PASSENGER TRAIN MILE IN CENTS.

|                               | 1889. | 1893. | Inc. | Dec. |
|-------------------------------|-------|-------|------|------|
| Maintenance way.....          | 18.24 | 17.05 | .... | 1.19 |
| Maintenance equipment.....    | 13.44 | 13.80 | 0.36 | .... |
| Conducting transportation.... | 41.64 | 43.92 | 2.28 | .... |
| General expenses.....         | 7.66  | 9.22  | 1.56 | .... |
| Not classified.....           | .18   | .07   | .... | 0.11 |
| Total.....                    | 81.16 | 84.04 | 2.90 |      |

These figures differ from the figures above quoted from the body of the report, as they show that the cost per train mile has increased in five years 2.9 cents, while in the body of the report the cost is stated to have slightly decreased. Taking the comparison for what it may be worth, we see that there has been a marked increase per train mile in conducting transportation and in general expenses. Here, again, if any material reduction is to be made it must be in wages.

However the statistics in these reports may be analyzed and applied, so far as they are capable of practical application to the future management of the railroad system of this country, the unvarying conclusion as to freight traffic is that the average railroad, in point of revenue, cannot remain solvent with any further reduction in the

rate per ton mile. The average revenue per mile of road in 1893 from freight traffic was less than \$5,000 per mile, and the average rate per ton mile was .878 cent.

The pressure to reduce rates is applied from two directions : on local traffic, from State railroad commissions, where they control rates, and on competitive traffic, from unregulated competition. Unwelcome and irrational as may be the exercise of the rate-making power by State commissions, the evil effect upon the welfare of our railroad system from this cause is not to be compared with the injury growing out of the denial of the right to make contracts for the division of competitive traffic. As well throw a piece of meat into a dog-kennel and expect it to be divided fairly according to the needs of each inmate as to expect rates on competitive traffic to be uniform as between shippers similarly situated. In either case an external power must be invoked if justice is to be done.

It is for the protection of the smaller shippers and for the weaker railroad companies that contracts for maintenance of rates by division of revenue should be legalized, and that the offending railroad managements should be amenable in the courts for the injury occasioned by their disregard of their plighted faith. When this is done secret rebates will cease, because there will be no longer any advantage in granting them and the corrupting influences which with unrestricted competition pervade our railroad corporations will be greatly diminished in virulence.

The difficulties in the regulation of passenger traffic are of a different character. They arise mainly from the extravagance which is general in the conduct of the service. Luxuries in the way of sleeping cars and dining cars are provided where the revenue from the passengers so accommodated does not justify the railroad companies in furnishing them, and the passenger who rides at night in the day coach and snatches his food from a lunch counter pays out of proportion for what he gets.

The remedy lies in reducing competitive train service

and by so doing to increase the revenue per train mile. It is not the increased rate per passenger mile that adds to the net revenue of a railroad company, but the increased returns per train mile.

The average gross revenue from passenger traffic per mile of road in 1893 was about \$1,800, and per train mile about \$1.06, and on many roads where the average is far below these figures the sleeping car service and the frequency and speed of passenger trains will be found to be governed rather by competitive zeal than by the net revenue per train mile. The lavish distribution of free passes is also an abuse which results in a loss of net revenue that might readily be secured by joint action on the part of our railroad managements, but no single management can cope with it.

The investigation of the cost of the services rendered by the railroads as compared with the compensation received is necessarily an uninviting task. It leads one through pages of statistics frequently to find after laborious analysis that the facts are so stated as to be incapable of practical application. And even when conclusions are reached which appear to be well founded they are at last but averages which each one of us may look upon as inapplicable to the particular conditions under which his own road is operated. Still I believe that no person interested in our railroad system, either as owner or manager can follow the figures and reasoning contained in this address without agreeing with me that there is no margin for further reduction in freight rates, and that the passenger traffic is at present being conducted without profit as a whole to our railroad system.

## RAILROAD ORGANIZATION.

(October 16, 1895, at Hotel Brunswick, New York.)

Order is Heaven's first law ! This is as true of human organization as of divine. Without order confusion follows and inefficiency. The more complicated and extensive the organization the more essential is orderly method.

This is the test to be applied to any method of organization. Does it secure for the end proposed the greatest efficiency at the least cost ? With this test in mind, let us consider the principles essential to an efficient railroad organization.

A railroad corporation is divisible into two parts ; that which it has in common with other corporations, and that which is peculiar to the operations of a railroad.

To the corporate part belongs the corporate business of the company, as also its financial and legal affairs. It therefore includes the offices of the president, directors, secretary, treasurer, auditor and legal counsel.

The railroad organization proper has to be considered with reference to the end for which the corporation has been formed ; the transportation of persons and things by rail with safety and dispatch. To the extent that this purpose is attained the organization is efficient. In whatever respect that purpose is not attained, in that respect the organization is defective.

A fundamental requisite of an efficient organization is that there shall be a clearly defined division of responsibility among the several officials and employees who carry on the operations for which it is formed. This division of responsibility naturally follows the line of separation between the duties to be performed. These duties in a railroad organization are readily separable



into certain general departments, which may be briefly described as follows :

First, as relating to the roadway.

Second, as relating to the vehicles passing over the roadway.

Third, as relating to the persons and things transported in those vehicles.

There are therefore three, and only three, grand divisions of railroad operation. There may be other duties and operations incidental to the main purposes of railroad transportation, but, whatever they may be, they are referable to one of those three divisions or departments. This classification is simple and should be rigidly adhered to if a clearly understood division of responsibility is to be kept in view. It does not include the collection of revenue, as that is not an essential element of railroad transportation, but belongs to the corporate administration, and as a matter of railroad organization should be considered apart from the departments pertaining strictly to the transportation of persons and things.

Taking these departments one by one and beginning with that relating to the roadway, it should include the construction and maintenance of everything that is part of the roadbed and of the real estate belonging to the company, or which is permanently attached to either ; as tracks, fences, water stations, shops and all other structures. Permanent train signals should also be included. Not that the officials of the roadway department should determine the character of such signals, but that, after this has been determined, they should be responsible for the condition in which such signals are maintained.

The next department relates to vehicles passing over the roadway and includes the construction and maintenance of locomotives and cars of all kinds ; as also of all tools and appliances used for such purposes, but not the control of the men employed in train service. The line of division here should be at the engine house. Engine-

men and firemen are not responsible for the construction or maintenance of locomotives any more than conductors and brakemen are for the condition of cars, and therefore neither class of trainmen can be properly classified in the rolling stock or machinery department.

The third department relates to the persons and things transported. It is the transportation department proper for which the other departments exist, and which are in fact auxiliary to it. It includes all persons employed in receiving, caring for, transporting and delivering the persons and things intrusted to the railroad company for transportation.

These then are the three departments of a railroad, the roadway, the machinery and the transportation departments. To be efficient each should be under a single head, and all should be under one managing officer, himself responsible to the corporation.

In this division of railroad operations nothing has been said about what is known as the traffic department, and for the reason that the department known by that name in this country has no proper sphere of action so far as the railroad is concerned. It properly belongs to the revenue department of the corporation. For the making of tariffs and the collection of revenue are matters which affect the welfare of the corporation, but have nothing to do with the transportation of persons and things with safety and dispatch, and it is only when the two purposes coincide that there can be any doubt as to where the line of responsibility should be drawn between the persons having the matters in hand.

In handling freight, the persons who receive, load, transport, unload and deliver, clearly belong to the transportation department, while those who affix the rates to the billing and those who collect the charges do not. The latter belong to the revenue department of the corporation, and have no more to do with transportation than the man who fixes the price for a barrel of flour or who collects

the money when it is sold, has to do with growing the wheat or milling the grain from which the flour is made. The same is true of passenger traffic. The man who sells the tickets has nothing to do with the transportation of passengers, and if the tickets, when sold, were not collected on the train, the train men would in no way be connected with the revenue department of the corporation.

Inviting business, either by advertisements or by personal solicitation, is also a matter entirely foreign to the management of a railroad, for it is something which affects revenue but not transportation.

The traffic department, as we know it, might therefore be separated entirely from the railroad organization and be absorbed into the corporate management, without detriment to the safe and prompt transportation of persons and things, and very probably to the advantage of the corporation.

For the proper conduct of the operations of a railroad as a means of transportation, the manager, with his subordinates, should be responsible to the corporation, and for the making of tariffs, the solicitation of business and the collection of revenue, the traffic manager should be responsible.

There is yet to be considered the purchase, storage and distribution of materials and supplies. It would seem that the purchasing belongs to the corporate management, and the caring for and the distribution of supplies to the railroad management proper. This division of responsibility can be advantageously made where there are suitable methods for making requisitions, specifications and tests.

And now to a more detailed consideration of the organization in each department. There is no doubt that the roadway department should have at its head a civil engineer experienced in railroad work. The operations under him readily fall into certain sub-divisions ; as the maintenance of roadbed and track, for one thing, of

bridges, of buildings, of signal apparatus, of pumping machinery, etc.

The track should be maintained in sections of no less length than would require the attention of a gang sufficient to handle a rail or a hand-car readily, nor should it be so long that the foreman cannot properly inspect his entire section daily on a velocipede and still look after his gang.

The track section is thus the unit on which the operations of the roadway department are based, and the number of sections to be placed under the supervision of one roadmaster should be limited by his ability to pass over a certain track mileage for purposes of inspection in a single day. As a general thing it will be found that a roadmaster or supervisor cannot properly look after more than one hundred miles of track. Besides the usual section gangs, he will require a bridge gang for the repairs of ordinary trestle bridges, a house carpenter gang for repairs of buildings, a man to care for water station machinery, plumbing, etc., and perhaps another to keep the signal appliances in order.

The inspection and maintenance of the more important structures, including bridges, should be directly under the head of the roadway department and should be in charge of a competent engineer, to whom the inspection of all bridges should be assigned. This inspection should be personal and without reference to the roadmaster or his men.

The organization then of the roadway department should consist of an engineer of maintenance of way with one or more assistant engineers reporting directly to him, as also one or more road masters responsible for the section gangs in charge of track and the forces necessary for the maintenance of buildings, bridges, fuel and water stations and permanent signal apparatus. To the roadway department should be assigned the care of shop buildings and engine houses as well as of any other structures, for it

does not follow that a good machinist is a good house carpenter, and it is more economical to have all inspection and repairs of buildings under one head than to have that responsibility divided.

We next come to the department in charge of the construction and maintenance of locomotives and cars—briefly termed the machinery department—and which is readily divisible into the locomotive department and the car department. On some roads each of these departments may be in charge of a foreman. On others the shops may be so extensive as to justify a more radical separation of the two under a master machinist for the one and a master car builder for the other, but the whole department should be under the control of a competent mechanical engineer, to be styled the mechanical superintendent.

This department should not control the employment of enginemen, firemen, wipers, or car cleaners, for this class of men belongs to train service and not to maintenance. This is also true of the storage and issuing of fuel for locomotives, which is not necessarily connected with shop work and is more or less distributed along the road.

Where there are several division shops, the principal repairs or reconstruction of rolling stock should be concentrated at one of them, for special tools can thus be more profitably employed, and also a better class of draughtsmen and mechanical engineers than if such work were scattered among all the shops on the road.

Designs, plans, specifications and contracts for new work should be prepared in the office of the mechanical superintendent, and if locomotives or cars are built by the company to any considerable extent, the shops for this work should also be directly under his supervision.

The organization of the machinery department would then comprise a mechanical superintendent, assisted by a master machinist in charge of the locomotive department and a master car builder in charge of the car department, with foremen in charge of the several division

shops and a competent mechanical engineer in charge of the principal shop in which all new work and reconstruction is carried on. There will also be required the services of a general storekeeper.

Next in order is the transportation department, to which is assigned the work for which the track and the rolling stock have been built and are maintained. The manner in which its operations are conducted is the test as to whether persons and things are transported over the railroad with safety and dispatch, and upon the manner of its organization is largely dependent the success of the corporation. The head of this department should control all the instrumentalities essential to transportation from the time that a person or thing comes under the care of the corporation until they pass out of it. Such a control would cover all responsibility in that connection not already assigned to the roadway and machinery departments, and would exclude the making of tariffs, the solicitation of business, the collection of revenue, and the purchasing of materials and supplies. It would include the station and yard service, the cleaning and handling of engines and cars, the movement of trains, the receiving, loading and billing, unloading and delivery of freight, etc. The units of service are the station force and the train crew, and this is broadly the division of responsibility in transportation service. Until a train has been made up both the vehicles and the objects to be transported are under the control of the station forces. But when the vehicles have been assembled into a train, the control of train and contents is necessarily of a different character until the service has been performed and the train disintegrated.

It would seem then that the superintendent of transportation should be assisted by a chief in each branch of service—a chief of station service and a chief of train service. Under the former should be placed station masters and agents with their subordinate clerks, porters and laborers and yard masters with their switching crews,

while the latter should control the trainmen, telegraph operators and signal men. Such a classification clearly defines the responsibility for each kind of service. Separate provision, of course, should be made for conducting other service incidental to transportation, but which is neither station nor train service.

It is not so easy to define the lines of division between the traffic and the transportation departments, still they impinge on each other at but few points. A ticket seller in a station building holds a divided allegiance, but one in a city office does not. In fact, so far as the station ticket bureau is a bureau of information it belongs to the transportation department proper, but so far as it is an office for the collection of passage fares it does not. It is also true of a passenger train conductor that in the collection of fares and the inspection of tickets he is responsible to the revenue department. Baggage masters at stations occupy a similar relation to the revenue department in the collection of baggage charges and inspection of tickets before checking. In handling freight the transportation department first comes in touch with the revenue department when the freight has been billed and the charges are to be affixed, and again for the collection of charges when the articles are delivered. Very little thought, however, is required to dispose of this dual responsibility in a satisfactory manner.

There is a broader view to be taken of railroad organization where the service is extended over a long line or over many branches. Here the responsibility must not only be divided by departments but also by territorial districts or divisions.

The main issue to be determined is whether the departmental responsibility shall continue through directly to the head of the department regardless of the territorial division, or whether it shall be concentrated in each of these divisions before reaching the head of each department. The same question has been agitated as to army

organization ; that is, whether a division or army corps should be treated as a unit in itself or as part of a greater unit, the army. Indeed it has been carried farther yet, to the point that whether in an army there should be certain departments not directly responsible to the commanding officer but to certain chiefs of bureaus of administration.

The proper test to be applied is still that of the greatest efficiency at the least cost, and this again involves the placing of responsibility where it cannot be shifted in case of failure or neglect. That for which a man is to be held responsible that he should control and all the instrumentalities essential to that control. To the extent to which a division or corps commander is expected to act independently, to that extent his authority should control. To whatever degree the operations in his sphere of authority are to be co-ordinated with operations outside of that sphere, to that degree he cannot act independently and co-ordination be secured.

Applying this principle to railroad management, it would seem best to give free rein to a division superintendent up to that point where it is essential to the welfare of the transportation system as a whole, that his course should be brought in accord with the course of other officials outside of his sphere of action. His sphere of action is his division of the road, and within that division there should be no divided authority covering the transportation of persons or things with safety and dispatch. But for this to be successfully accomplished the operations upon his own division must be in certain respects co-ordinated with the operations upon other divisions of the road. Here come into play the general rules for the movement of trains and the regulation of the conduct of employees, the preparation and observance of through time-tables and of mechanical standards. His authority upon his division is exercised subject to those restrictions which must necessarily be prescribed by an authority superior to his own. In these respects, then,



his responsibility does not extend beyond the observance of such restrictions. There is yet another phase of this territorial responsibility which involves the divided allegiance of department employees to the division superintendent and to the department chief. It does not arise so much in the transportation department—that is, in station service or train service—for employees in such service can only reach their department chief, the general superintendent of transportation, through the division superintendent. But it does arise in connection with the roadway and machinery departments.

Shall the division superintendent be entirely relieved from responsibility as to the condition of track or equipment? This question is in some respects answered by asking another. Will the efficiency of the service be diminished in any way if he be so relieved?

All railroad operations may be considered in one of two ways, either theoretically or practically. Territorially, these points of view coincide in the position occupied by the division superintendent. Now, shall there also be for each territorial division a division superintendent of roadway and one of equipment, respectively reporting to the chief engineer and to the mechanical superintendent? Or will not this multiplication of offices and the attendant division of responsibility be avoided by extending the authority of the division superintendent of transportation to some extent over the operation of the machinery and roadway departments within the limits of his division? Plainly it will, if that authority be not extended beyond the limit of efficiency.

My own experience leads me to believe that the ordinary roadway forces can very well be subjected to the authority of the division superintendent; that the latter should conform to the regulations established by the chief engineer as to standards, but that the care of important structures should be directly under the chief engineer. The selection of frogs and switches and the responsibility

for track supplies should also rest with the chief engineer, who should issue them on the requisition of the division superintendent, so that the use of all kinds of material of different sizes and dimensions may be prevented and standards be preserved. The effect of this policy would be that the division superintendent would represent the chief engineer on his division just as he did the general superintendent of transportation, except in those matters requiring special technical training.

The same policy may be pursued with reference to the mechanical department, though perhaps in a different way. A division superintendent can get over his own division much oftener than the mechanical superintendent can be expected to go, and if he be permitted to exercise a certain degree of supervision over the shops in a practical way, he can form a pretty good opinion as to how the work is going on and to what particular work preference should be given. A good deal of work for the roadway department is done in these division shops, and here it is well that there should be no division of responsibility as to neglect or delay.

The conclusion to which this reasoning brings us is that within the territorial authority of a division superintendent all railroad operations should be under his supervision, except as to regulations, standards, important purchases and the inspection of important structures. The threads of authority thus gathered together in his hands should from that point tend to the three department heads, the chief engineer, the mechanical superintendent and the general superintendent of transportation, to be again brought together in the general manager's office.

There are three men who make or mar the reputation of a railroad company with its patrons: the passenger train conductor, the station agent and the division superintendent. Within the scope of his authority each of them should be put in a position to determine definitely

and promptly any matter that may be referred to him from persons having business with him. Further reference to distant superior authority leads to delay and dissatisfaction with the railroad company. With proper rules and regulations it is practicable to enable either a conductor or an agent to say yes or no promptly to any question that may be asked of him in the line of his duty.

The relations of the division superintendent to the public are of a different character. To the people having business with the road he is the embodiment of the corporation. When they want anything they go to him for it, and if it is evident to them that he can answer nothing definitely, that matters of routine have to be referred to a distance for the endorsement of some superior official before a definite answer can be given, they not only chafe at the delay but they feel that an adverse decision is due to the fact that they have not been heard, that they have not had their day in court. For these reasons, therefore, the division superintendent should be entrusted with very considerable discretionary powers in dealing with the people among whom he lives and with whom he is in daily communication. Where this is done they feel that their interests are considered by the railroad management. Where it is not done they repeat the trite sayings about corporations having no souls, and about gigantic monopolies, and are the ready prey of designing demagogues.

By all means then the division superintendent should be held up to the public as the immediate authority in all matters of ordinary interest to them and should be invested with power corresponding to that position. It is a mistake to make of him nothing more than a chief of train service, a mere link in an endless chain of officials propelled by motive power a thousand miles away.

REVIEW OF THE WORK OF THE ASSOCIATION  
FOR TEN YEARS. INTERNATIONAL RAILWAY  
CONGRESS. INTRODUCTION OF AMERICAN  
METHODS ON FOREIGN RAILWAYS.

(April 15, 1896, at Burnet House, Cincinnati, Ohio.)

Ten years ago, in this very city of Cincinnati, the American Railway Association was formed by the consolidation of the General Time Convention with the Southern Railway Time Convention. In looking backward over this decade, what justification do we find for the existence of this Association? To what extent has it fulfilled its object—"the development and solution of problems connected with railroad management in the mutual interest of the railroad companies of America"?

Had it accomplished nothing else than the general adoption of Standard Time, or the preparation of the Standard Code of Train Rules, or the adoption of the interchangeable type of automatic freight car coupler, or of the standard height of freight car draw-bar, or of the uniform location of hand-hold and grab irons, or the general recognition of car service associations, the development and solution of either one of these problems, all of which are due to this Association, would in itself have justified its existence.

But the work which in the past it has accomplished is but an earnest of its possible usefulness in the future. Those who have observed its growth appreciate its adaptability to the broader fields of utility in the mutual interest of the railroad companies of America. It is not only available for co-operation among the railroad managements themselves, but also as the means of communication between the American railway system as a whole and the

American people as a whole on any matter affecting the practical management of railroads.

This was forcibly illustrated by the service which the Association was able to render in the Congressional legislation which resulted in the Safety Appliance Act. The public interest which had been excited for the protection of railroad employees in coupling cars found vent in a vigorous demand for statutory measures that was recognized in the platforms of the two principal parties then about to engage in a contest for the election of a President of the United States. The Congressional Committees on Inter-State Commerce undertook to determine technical questions relating to safety appliances. Voluntary committees of State railroad commissioners and of labor organizations came to their assistance. Inventors, cranks, promoters and lobbyists played a part as well, until the opportunity was offered for the representatives of the American Railway Association to appear before the Congressional committee to which the preparation of the bill had been entrusted. It is to the credit of the members of this committee that they recognized the character of the men that constituted this deputation. They recognized that they were thoughtful and well informed, experienced in the matter of which they spoke, and earnest in their desire to bring about a reform in the general use of railway appliances; that they represented no cliques, no combinations; that they were influenced by no unworthy motives, but that they represented the American railway system as a whole, and were able and willing to indicate the proper solution of a problem beset with many difficulties. The committees listened to them patiently and with interest. They saw the way to relieve themselves from deciding matters of technical detail, of which they were ignorant, by referring them for determination to a body of acknowledged experts, the choice of the men who manage the practical affairs of the railways of this country, and to-day you will find in the Railway Safety Appliance

Act that to the American Railway Association has been given the authority to designate the technical details contained in that act, which is now the law of the land.

The way has thus been provided for determining similar details for future legislation, for where can be found a body of men better equipped to determine them, or whose conclusions would be more readily accepted by the American people as embodying the most modern railway practice? And recently the way has been also opened to even a broader field of usefulness for the American Railway Association.

What was known in this country of the International Railway Congress, which has for many years fulfilled a similar purpose across the Atlantic Ocean, until our own Association was represented in that body at the London meeting of 1895? A representative of some one of our principal roads had occasionally appeared at one of its previous meetings, but the invitation to our Association for membership aroused an interest which led to the appearance of over forty American delegates at the London Congress. It is true that this was but a small minority of the seven hundred and fifty delegates present, but the effect produced by their appearance on this occasion was out of all proportion to their numbers. The very fact that they represented a greater railway mileage than all the other railway delegates particularly emphasized the presence of the importance of the American delegation. The additional fact that they were akin in blood and language to the British delegates who were our hosts was another cause for giving them a prominent place on many occasions. The opportunities there afforded for personal acquaintance with distinguished representatives of the railway managements of Continental Europe, of South America, of Asia and of Australia, and of impressing upon them the merits of American practice, were of a character that could not have otherwise been obtained. And there is reason to believe that the impressions then made upon the

minds of these men, who control the construction and operation of the railways of that other half of the world beyond the seas, will tend to increase their desire to know something more about the appliances and methods which in one generation have covered our country with a net-work of railways about equal in mileage to the remaining railways on the face of the earth.

And here, again, is a field of usefulness for the American Railway Association, the extent of which and of its importance to our people cannot be adequately appreciated by those who were not present at that Congress. It is the introduction of American railway methods of construction and equipment and operation on that tripartite continent of which Europe is the smallest member.

Of that continent of thirty-three million square miles Europe constitutes but one-ninth in area, and yet Europe is larger than the United States. Of the total railway mileage of the world nearly one-half is in this country and most of the other half is in Europe.

It is to the other great members of the trans-Atlantic continent—it is to Asia and Africa that I would draw your attention, with their area of nearly thirty million square miles and their population of one thousand million human beings. I would ask you to lose sight of the greatness of your own people for a moment, of your population of sixty-three millions and your territory of three million square miles, and think of these other lands with ten times your area and fifteen times your population.

Is this great field for railroad construction and management to be disregarded by those who are wont to boast of American energy and enterprise? Are we to remain contented with the restricted possibilities for American railway men and for American manufacturers of railway material in the maintenance and operation of roads within our own national boundaries? So long as we are adding from ten to twelve thousand miles a year to our existing mileage the opportunities thus afforded them might have

been sufficient for their numbers and for their productive capacity, but the conditions are now becoming different, both for railroad men and manufacturers in this country. We are approaching gradually to the conditions which prevail in Europe, where there are more men and larger productive plants than can be profitably employed at home, and the time is not far distant when we also must look abroad for their employment.

But it would be a waste of time to seek for such opportunities either in Great Britain or in the western states of continental Europe. For European railway construction and appliances and methods of operation have been firmly founded on British practice ; a practice so different from ours in all respects, even in technical terms and in ordinary railroad slang, that our own railroad men would there be out of place, whether as constructing engineers, as locomotive runners, conductors, brakemen or switchmen, and our manufacturers of rails, equipment and appliances as well.

Indeed, Great Britain and the western European states themselves now look abroad for profitable employment for their men, their manufacturers and their surplus capital. Great Britain has found already her field in her own colonies and foreign possessions. France has her vantage ground in Africa, in Algeria and Senegal. Little Belgium, with her eleven thousand square miles of territory and her six million people, has established hers in equatorial Africa, and the Germans, just now outgrowing in productiveness their own needs, are eagerly watching and imitating their British kinfolks. Austria-Hungary, with half our population, is stretching her rails and her trade down the Danube and into the Balkan Peninsula.

In considering this general advance of European countries all along the strategic line of this campaign for African and Asiatic trade, we may well say, what will be left of the United States, when we begin to look beyond our borders ? On the north of us is Canada, British



by sentiment, and but partly American in railroad practice. To the south of us is Mexico, where we have some advantage over European methods and appliances; some little opportunity in Cuba and Jamaica, and more perhaps in Central America. Then comes the semi-continent of South America, with nearly twice our area and half our population.

This is our sphere of action, or, at least, that which will be left to us if we close our eyes to what is going on elsewhere on the globe, while European methods of railway construction and operation are being initiated in the vast regions of the earth still unprovided with modern facilities for transportation. If we wait until fifty miles is built from one African seaport and twenty from another into the heart of that continent, all under the British system, we may say farewell for employment thereafter for any American men in those regions, or for the sale of railway appliances of American make.

If French or Belgian or German engineers lay out a railroad line anywhere on the habitable globe, the French or Belgium or German appliances follow, as surely as the thread follows the needle. There is Russia, with twice our area and nearly double our population, just inaugurating a trans-continental railway system. That great empire was represented at the London Congress by a delegation of intelligent, experienced men, eagerly seeking for information. The Japanese representatives, too, were special inquirers as to American methods.

For, after all, American methods are best suited for opening up routes on which the traffic has yet to be created. Whatever is best in European practice is best adapted to routes which are intended to furnish facilities for existing traffic. It is information as to cheap methods and cheap appliances which is wanted by those who are pioneers in opening up the interior of Africa and of Siberia, and it is just this information which they will never get in Great Britain or on the continent, for in those

countries they have but one way of doing anything in railroad practice. There is but one pattern and all kinds of cloth must be cut to suit it. They have loaded down their secondary railroad systems with expensive structures and interlocked switches and the attendant host of employees, so that even at home there still remain considerable communities without sufficient railroad facilities, because they cannot be operated with profit as constructed in their way ; yet we have, perhaps, thousands of miles of track paying expenses on less traffic.

It is not our first-class roads, our trunk lines, that the projectors in those untried fields can study to advantage. These roads approximate in cost of construction and management to those with which these projectors are already familiar. It is the cheap road, the cheap methods of operation that their interests require and of which they are ignorant. They look upon a single-track road operated on American methods simply as a death trap ; something that is only operated at the peril of both passengers and employees. When the American delegates spoke, at the London Congress, of handling fifty or one hundred trains a day and thirty or forty thousand cars a month over a single track, the statements were evidently received as specimens of American brag.

Now, what opportunity is there for American methods and appliances getting even a foot-hold in lands where European influences prevail ? Evidently but little, so long as European ignorance prevails as to American methods and appliances, and it is just here that the value of the American Railway Association comes in ; that is, in pointing out the way for penetrating this ignorance, for dispersing the clouds of prejudice and the fog of indifference which obscure the minds of those European engineers that control the purse-strings of the European capitalists who are to provide the means for constructing the untold thousands and ten of thousands of miles of

railroad yet to be built in Asia and Africa and elsewhere, outside of the present limits of American influence.

Our experience at the meeting of the International Railway Congress in London has impressed upon our minds the hopelessness of any attempt to remove European ignorance and prejudice as to American railway practice by discussions held across the ocean. We cannot teach by precept. We must teach by example. Instead of addressing the seven or eight hundred railway engineers and managers that make up the International Congress, in a land where there is not one example of American railway practice, let us induce that great body of men, foremost in railway reputation and experience throughout the world, to come and listen to us here, where every word that we speak will be multiplied in effect one thousand fold by what they will find all around them.

It is a case in which a great result is to be sought, one of momentous importance to the future welfare of our people, and the effort to accomplish this result must be correspondingly great. Desultory, isolated attempts will fail. Our energies must be concentrated to be effective, and the most effective way to concentrate them can only be afforded by the American Railway Association.

The next meeting of the International Railway Congress is to be four years hence in Paris, at the time of the Exposition, and from what I learned unofficially at the London meeting, I believe that if a proper effort be made on that occasion, the succeeding meeting can be held in the United States ; but if such an effort is to be made, then no time should be lost in preparing to make it, for there is much to be done if we are to offer such hospitality as was accorded to the Congress last year in Great Britain, and we should not offer less to those whom we invite across the ocean to visit us.

I do not know that I could have selected any subject for my address, on this the last occasion on which I shall have the honor to appear before you as your president,

that could more fitly emphasize the termination of my nine years of service in that office. I say this because I appreciate the honor which you bestowed upon me when, in my absence and without my knowledge, you selected me as your principal representative at the meeting to which I have just referred, and where my eyes were opened to the enormous possibilities that I have just unfolded to you. I mention this only as the chief one among the many signal testimonies that I have received at your hands during my long term of office, of your continuing appreciation of my devotion to the great cause which you represent, and I shall always feel that in this one instance alone I have been fully rewarded for all my efforts in your behalf.

And now that I am about to say farewell, permit me to direct your minds for a moment to the principle which, in my opinion, should ever be the touch-stone to be applied to any subject that may be presented for your consideration.

The object for which you are organized is distinctly stated in your rules of order as "the development and solution of problems connected with railroad management in the mutual interest of the railroad companies of America." Your action is only "recommendatory in its character," and "not binding upon any of the companies represented." So long as these cardinal points in your rules of order are carefully observed, your deliberations and conclusions will be of increasing value to the railroad companies constituting the members of this Association.

But it will be an evil day when they are ignored, when the "mutual interest of the railroad companies of America" shall be disregarded, or when the action of this body shall be considered as anything more than "recommendatory in its character."

Your proceedings have heretofore been harmonious in their results. However earnest your discussions, how-

ever decided your opinions, you have all sought the same end ; honestly to work out the problems before you, in the mutual interest of those whom you represent, and so it may be expected to continue, so long as you discuss nothing but practical matters, so long as you strictly keep away from matters involving questions of revenue to your members. You are not votaries of Mammon. You seek the truth with reference to questions affecting the maintenance and operation of the great railroad system of this country ; its practical management has been intrusted to you, and while you continue to be guided by the principles which constitute the foundation of your Association, your feet will be in the right path, and the structure which you have been building up for the past ten years will maintain its stability and increase in usefulness.

But, however careful you should be to remember that the action of this Association is only recommendatory in its character, do not be unmindful of what that action represents. It represents the convictions of the foremost railroad officials of this country, as to the best methods of American railway practice ; convictions reached with such opportunities for gathering information as no single one of you possesses, and reached, too, after the careful deliberation of your standing committees, selected by yourselves as the most competent among you to apply their large experience to the solution of the problems submitted to them for determination. After the solutions thus reached have been laid before this body, composed, as it is, of those who are confessedly the ablest and foremost in the land in their own profession, and the seal of approbation is here stamped upon the conclusions of one of your standing committees, who is there so great in himself that will undertake to deny that the solution of any of the problems of railway management thus obtained is not in accordance with the best practice and is not in the mutual interest of the railroad companies of America, after it has been approved by the American Railway Association ?



OTHER ADDRESSES, ETC.,  
ON  
RAILWAY MANAGEMENT.





## OTHER ADDRESSES, ETC., ON RAIL- WAY MANAGEMENT.

### EFFICIENT RAILROAD MANAGEMENT : ADVAN- TAGES OF AN ADVISORY BOARD TO THE GEN- ERAL MANAGER.

(Originally contributed to the *Railway Review*, October, 1884.)

The tendency to consolidate independent railroads into homogeneous systems seems irresistible, especially in the United States. Separate corporations have been united only to be merged into greater combinations, and these in their turn have become members of mighty systems whose mileage is stated in thousands. In spite of physical barriers, of local prejudices and of legislative obstructions, they are gradually drawn together by an influence almost as powerful and as pervasive as the universal law of gravitation. Under all forms of government, under despotic czar or constitutional monarch or popular sovereignty, this influence is everywhere at work ; everywhere a potent factor in the reorganization of militant into industrial communities. Its effect upon the welfare of society is far from being understood ; it has as yet been scarcely the subject of comment. Yet it furnishes matter for serious reflection to the statesman, to the political economist and to the sociologist.

Among the many aspects in which this subject may be considered there are several which are of especial interest to stockholders and to managers ; none more so than that of the efficient management of the gigantic organizations which have been thus formed, and which it is the purpose of this article to discuss.

The analogy already remarked between the tendency to consolidation and the mysterious influence of gravity may be still further drawn upon in considering the direction

in which the management of great railroad systems may be expected to develop. The same forces, centripetal and centrifugal, are present as in the solar system. If they could be as equally balanced, the same perfection might be attained. But this is not to be expected of the works of man—and this particular work of his has attained as yet but a moderate degree of excellence. In its present state of development the centripetal force is in excess, and the tendency is strong towards a centralized management. In turning from the works of nature to those of mankind we enter the domain of human government as well as of Divine law. We here find the centripetal force represented by despotism and the centrifugal force by anarchy, where either is in excess. A despotic form of government is really efficient only within a restricted area and over a small number of persons. It is limited by the capacity of the individual despot. Of unquestioned virtue in the family as parental authority and the only practicable form of government among errant tribes of Arabs and Tartars where the despot rules as patriarch, its usefulness diminishes as the extent of its jurisdiction increases. When millions of men occupying a vast territory are brought under autocratic sway it confesses its inefficiency to govern by lapsing into rank tyranny. In fact under such rule the tyrant does not govern ; it is the favorite who governs and not the ostensible ruler.

After many bitter conflicts with despotic power, after many experimental failures, the more enlightened nations are learning how to govern efficiently. They are learning that one man can do but so much work in a given time ; that instead of eking out the individual capacity—mental and physical—of the responsible governor, by resorting to the aid of irresponsible favorites, greater efficiency is obtained by delegating some part of his work to legally authorized assistants. In a word, the individual despot is replaced by an organized government, and that which was inefficiently done by one is efficiently done by

several. The degree of efficiency depends mainly upon the excellence of the organization.

It is no part of the purpose of this article to follow this particular line of thought any further than may be necessary to illustrate or enforce the principles involved in an efficient method of railroad management. The vast systems which have resulted from progressive aggregation have outgrown the possibility of autocratic control. A division of duties, of responsibility and of authority has of necessity been accomplished, and out of this division has grown a method of management which may well be compared to an organized form of government.

As the government of nations had its origin in the patriarchal rule, so has it been with the management of railroads. There are those among us whose memory goes back to the patriarchal stage of management, when most corporations owned not more than fifty or a hundred miles of track ; when the president was the sole and direct controlling spirit ; when the treasurer sold tickets at the principal passenger station on the road and the freight agent at the same station was virtually the head of the transportation department ; when no bill was paid except upon the order of the president, and periodical reports and statistical statements were unknown. Some of us remember when current gossip pointed out the irresponsible adviser whose favor was desired when appointments were sought ; when promotion was capriciously bestowed, and dismissals resulted from a fit of passion.

The experience of half a century has developed a form of organization which has been generally accepted as the pattern of efficient management. It is based upon a recognition of the several purposes which the organization is expected to fulfill. There is, first, the road which forms the line of communication, whose maintenance is in charge of the roadway department. Then there is the movement of the vehicles in which freight and passengers are carried, which service is performed by the transportation de-

partment, and the maintenance of these vehicles by the car department and of the motors by the locomotive department; or, these two departments may be operated jointly as the machinery department. There are the somewhat complex duties involved in soliciting and handling the business of the traffic department, which may be divided between the general freight agency and the general passenger agency. These are the principal operating departments, but the organization must also include a fiscal agency under the treasurer, a department of audit and statistics, a purchasing agency and perhaps a technical bureau and a legal department. With a general superintendent or a general manager, assisted by division superintendents and agents, the plan here given is the recognized type of a modern railroad organization, apart from what belongs to it as a legal corporation. Admitting that circumstances have made it what it is, and that it is therefore best suited to the conditions under which the work is to be performed, the question is how to get the most efficient service out of it. The tendency is toward the concentration of authority in one man; the effort is a sort of congestion at the periphery of which he is the center. Everything in the direction of progress and reform must be initiated by the head of the management. The motion in that direction is not uniform: it is spasmodic. Men ordinarily move in grooves—in the line of least resistance. Perhaps it is as well that they do. Those who have to manage them have only to prepare the grooves and they can then know where to find those whose duty it is to move in them. But there may be too much of this. It is not well for all but one man in an organization to be kept in grooves; it is not well for the heads of departments to be confined to registering and executing the edicts of the responsible manager of the railroad property. If this course be pursued, then the official head will be taxed beyond his individual capacity and the machine will not be at its maximum state of efficiency. It is this reservation by

the central head of all power to originate changes, which is to be guarded against in the organization of great railroad systems. Its disadvantages are shown in the efforts to attain uniformity in non-essential matters ; in establishing rigid standards where progressive improvement is possible, where the approximately accurate adaptation of ends to means has not been reached. The more this tendency to uniformity and centralization is encouraged, the less will be the desire for change, the smaller the opportunity for progress and reform, and our railroad system will gradually approach a condition of fixedness ; a sort of mental petrification akin to Chinese forms of thought and far removed from that ready, inventive turn of mind, full of resources, self-reliant and quick to appreciate a better way of doing things which we are pleased to appropriate to ourselves and to call "truly American."

If this centralized despotic type of railroad organization—the Chinese type, so to speak—is to be guarded against, that which should be preferred is right before us, and is indeed "truly American." It is the federal type of organization. It grows out of considering the entire system not as a uniform mass, but as a congeries of smaller bodies, each moving in its peculiar orbit, but co-ordinated to one common end by a central force—in short, a solar system.

Under such a plan of organization, the officials in each subdivision should be free to manage their local affairs to suit themselves : they should only be constrained for the general good. Uniformity, so far from being encouraged should be discouraged, save when essential to economy and to a better service for the public. Each sub-organization, if left to itself, will work out improvements and suggest ideas that may be assimilated by the central authority for the general good, and instead of one man trying to do the thinking for all in matters of detail, he may be assisted by the mental efforts of all in everything save that in which he alone can do the thinking.

The principal part which the head of a great system

should retain for himself is not the originating of ideas nor the institution of reforms, but the co-ordination of the efforts of those who are responsible to him, so that "all may be parts of one resplendent whole." There is nothing original in these suggestions. They have occurred to all who have had experience in organizing bodies of men : they are to a greater or less extent recognized in the management of our principal railroad systems, and the greater the extent the better the result. They have been especially recognized in the management with which I am connected, and the experiments which we have been led to make in thus recognizing them have been so interesting to me as to induce me to consent to become a contributor to the series of articles for publication in the *Railway Review*. As the experiment was in a great measure a personal one on my part, and as I propose to state with some particularity its origin and development, my statements must of necessity assume a personal form.

Beginning in 1879 with the organization of the Savannah, Florida & Western Railway Company, which succeeded the Atlantic & Gulf Railroad Company, there have from time to time been brought together under one general ownership and control a number of railroad corporations in South Carolina, Georgia and Florida, and in connection with them several steamboat lines—aggregating at present about 800 miles of road and 600 miles of steamboat lines—which, from the fact that Mr. H. B. Plant is the principal stockholder and the president of the more important corporations, is locally known as the "Plant system." This system is somewhat anomalous in its formation. It includes roads which have existed for 20 years and more, long enough to have been worn out ; wrecks that were to be reconstructed physically and financially ; as also lines projected in South Florida, into an almost unknown region, to be constructed under circumstances closely resembling the extension of lines into the western prairies. It includes corporations in three states, operated

under different laws, owning roads of different gauges and with stockholders not interested alike in all of them. Under these conditions it was not practicable to bring them all into uniformity, and, as a rule, it has not been attempted. What has been done toward operating them in a common interest has grown out of an experiment in the management of the Savannah, Florida & Western Railway with a different object in view.

That corporation is the prime factor in the "Plant system." Its practical management has been substantially continuous for 18 years. Many of its officials and employees have grown from youth to manhood in its service and are distinguished for their zeal and intelligence. It owns over 500 miles of road with extensive terminal facilities, including docks for the interchange of traffic both with seagoing vessels and with river craft, and offers an appropriate field for observation and experiment.

During a period in which the attention of all concerned was absorbed in making provision for a rapidly growing business, we were more intent on getting the work done than in finding out the cheapest way to do it, until we began to see that we were spending too much money, and our thoughts were turned upon retrenchment.

In an average monthly expenditure of \$150,000 it is not an easy matter to determine just where to economize without injury to the service. It requires a minute analysis of the expenditures and an intimate acquaintance with the detailed operations of the road. Even with this information at hand, the responsible managers of the property found their time so much occupied with other matters as to have but little of it left to devote to the consideration of expenses. Their efforts amounted to a monthly "scold" when the expense accounts were made up. This of course was unsatisfactory. It was still more unsatisfactory to feel that the ordering of these expenses was not under efficient control. In theory no expense

could be incurred without the approval of the superintendent; in practice that official hurriedly approved hundreds of vouchers without having time to examine them. Indeed, he could not be absent from his office a day or two without leaving a number of vouchers approved in blank to be filled out in payment of accounts which could not be delayed until his return. In this, as in other affairs, what looks well in principle may turn out otherwise in its application.

As already stated, this method of managing the expenditures was unsatisfactory, not only because the retrenchment was sometimes injudiciously applied, but also because the spending of the money had got beyond the control of those who were responsible for it. In considering this matter it was evident that the retrenchment had to begin before the money was spent, and that the men who really spent it must be held responsible for the way in which it was spent. It seemed absurd that the ostensible examination and approval of the accounts should be expected of the superintendent, whose time was otherwise fully occupied. An officer was therefore appointed, styled the comptroller, who was charged with these and with other duties. It was then determined that whoever was authorized to incur any expense should be required to certify to the correctness of the account before it went to the comptroller for approval. In this way the absurdity in preparing expense accounts for payment was gotten rid of, and an order was issued in the following terms :

I. All accounts will be audited under the supervision of an officer to be entitled the comptroller.

II. The auditors of earnings and expenses will report to the comptroller.

III. Expense accounts will be audited as follows :

1. Accounts for materials and supplies will be certified to by the purchasing agent as to prices and quantity.

2. Pay-rolls and other accounts that do not pass through the purchasing agent's office will be certified to by the general manager, superintendent, or head of the department in which the expense was incurred.



IV. All expense vouchers must be approved by the comptroller before payment.

V. The comptroller will prepare the reports relating to the earnings and expenses of the company, and of its leased or operated lines, and compile such statistical information as may be required.

VI. Heads of departments and other officers and agents of the company will make such reports and furnish such information to the comptroller as he may require.

We had now put the saddle on the right horse, so far as to fix the responsibility for making an account and to provide for its proper examination and audit, but we had yet to put the bridle into the right hands. In doing this we resorted to the experience of others to whom had been delegated the control of large expenditures under somewhat similar conditions. We found that under organized governments the officials who had to account for the disposition they had made of the nation's revenues did so by the aid of a budget—that is, they started the year with a detailed estimate of what they intended to spend in each department, and then kept to this line as near as circumstances would permit.

So we established a "budget." We called on the chief of each department to state in detail under specific heads, how much he would require to operate his department for the year. We added these estimates together, found the annual expense arrived at in this way to be greater than seemed to us judicious, called a conference of all in interest, discussed the various items and got the total estimated annual expense down as low as was thought to be practicable, if we were to have efficient service. The detailed estimate in each department was then divided into 12 equal monthly parts, and the head of each department was charged with the control of the expenditure appertaining thereto.

The comptroller was then instructed to prepare a monthly statement in which the expenses actually incurred in each department were compared in detail with the estimates. These monthly statements were presented at a

## STATEMENT "A"

MONTHLY ESTIMATE OF EXPENDITURES OF SAVANNAH, FLORIDA &amp; WESTERN RAILWAY FOR 1884.

| No. | Adminis-<br>trative<br>Depart-<br>ment. | Roadway<br>Depart-<br>ment. | Locomo-<br>tive<br>Depart-<br>ment. | Car<br>Depart-<br>ment. | Transpor-<br>tation<br>Depart-<br>ment. | Freight<br>and<br>Passenger<br>Depart-<br>ment. |
|-----|---|-----------------------------|-------------------------------------|-------------------------|---|---|
| 1   | \$2,195.00                              | \$810.00                    | \$725.00                            | \$205.00                | \$300.00                                | \$400.00  |
| 2   | 100.00                                  | 10.00                       | 5.00                                | .....                   | 20.00                                   | 100.00  |
| 3   | 330.00                                  | 60.00                       | 33.00                               | 8.00                    | 335.00                                  | 1,250.00  |
| 4   | 5.00                                    | 2.00                        | .....                               | .....                   | .....                                   | 416.67  |
| 5   | 3,500.00                                | .....                       | .....                               | .....                   | .....                                   | .....   |
| 6   | 2,000.00                                | .....                       | .....                               | .....                   | .....                                   | .....   |
| 7   | 1,000.00                                | .....                       | .....                               | .....                   | .....                                   | .....   |
| 8   | 800.00                                  | 20.00                       | .....                               | .....                   | .....                                   | 200.00  |
| 9   | 500.00                                  | .....                       | .....                               | .....                   | 15.00                                   | 120.00  |
| 10  | 550.00                                  | 50.00                       | 15.00                               | 5.00                    | 100.00                                  | 125.00  |
| 11  | 400.00                                  | .....                       | .....                               | .....                   | .....                                   | .....   |
| 12  | .....                                   | 250.00                      | .....                               | .....                   | .....                                   | .....   |
| 13  | .....                                   | 10.00                       | .....                               | .....                   | .....                                   | .....   |
| 14  | .....                                   | 35.00                       | .....                               | .....                   | .....                                   | .....   |
| 15  | .....                                   | 2,926.00                    | .....                               | .....                   | .....                                   | .....   |
| 16  | .....                                   | 200.00                      | .....                               | .....                   | .....                                   | .....   |
| 17  | .....                                   | 3,400.00                    | .....                               | .....                   | .....                                   | .....   |
| 18  | .....                                   | 810.00                      | .....                               | .....                   | .....                                   | .....   |
| 19  | .....                                   | 310.00                      | .....                               | .....                   | .....                                   | .....   |
| 20  | .....                                   | 15.00                       | .....                               | .....                   | .....                                   | .....   |
| 21  | 50.00                                   | 1,100.00                    | 140.00                              | 10.00                   | 240.00                                  | 300.00  |
| 22  | .....                                   | .....                       | .....                               | .....                   | .....                                   | .....   |
| 23  | .....                                   | 350.00                      | .....                               | .....                   | .....                                   | .....   |
| 24  | .....                                   | 545.00                      | .....                               | .....                   | .....                                   | .....   |



## STATEMENT "B."

COMPARATIVE STATEMENT OF EXPENSES AND ESTIMATE OF FREIGHT AND PASSENGER DEPARTMENT OF  
THE SAVANNAH, FLORIDA & WESTERN RAILWAY COMPANY FOR THE MONTH OF MAY, 1884.

| No. | Subdivision.                              | For Month of May, 1884. |             |         |          | From January 1 to May 31, 1884. |              |            |          |
|-----|---|-------------------------|-------------|---------|----------|---------------------------------|--------------|------------|----------|
|     |   | Estimated.              | Spent.      | Over.   | Under.   | Estimate.                       | Spent.       | Over.      | Under.   |
| 1   | Salaries not otherwise distributed.....   | \$400.00                | \$350.00    | .....   | \$50.00  | \$3,000.00                      | \$1,750.00   | .....      | \$250.00 |
| 2   | Office expenses.....                      | 100.00                  | 51.61       | .....   | 48.39    | 500.00                          | 444.58       | .....      | 55.42    |
| 3   | Stationery and printing.....              | 1,250.00                | 991.62      | .....   | 258.38   | 6,250.00                        | 6,367.50     | \$117.50   | .....    |
| 4   | Advertising.....                          | 416.67                  | 322.39      | .....   | 94.28    | 2,083.35                        | 4,022.18     | 1,938.83   | .....    |
| 7   | Insurance.....                            | 200.00                  | 75.89       | .....   | 124.11   | 1,000.00                        | 539.08       | .....      | 470.92   |
| 8   | Traveling expenses.....                   | 120.00                  | 26.75       | .....   | 93.25    | 600.00                          | 255.80       | .....      | 344.20   |
| 10  | Incidentals.....                          | 125.00                  | 139.05      | \$74.05 | .....    | 625.00                          | 817.15       | 192.15     | .....    |
| 21  | Gas and illuminating oil.....             | 300.00                  | 337.47      | 37.47   | .....    | 1,500.00                        | 2,398.64     | 758.64     | .....    |
| 34  | Crank and push cars.....                  | .....                   | .....       | .....   | .....    | .....                           | .75          | .75        | .....    |
| 35  | Machinery, tools and im-<br>plements..... | .....                   | 204.42      | .....   | 45.68    | 1,250.00                        | 1,584.99     | 334.99     | .....    |
| 36  | Furniture and fixtures.....               | 250.00                  | 97.99       | .....   | 68.68    | 838.35                          | 618.97       | .....      | 185.98   |
| 37  | Subsistence.....                          | 68.40                   | 74.38       | 5.98    | .....    | 342.00                          | 362.73       | 30.73      | .....    |
| 40  | Lubricating oil, tallow and<br>waste..... | 4.00                    | 2.37        | .....   | 1.63     | 20.00                           | 26.25        | 6.25       | .....    |
| 41  | Labor handling freight.....               | 5,522.90                | 5,639.54    | 116.64  | .....    | 27,814.60                       | 38,235.57    | 621.07     | .....    |
| 44  | Labor not otherwise dis-<br>tributed..... | 2,648.50                | 2,588.32    | .....   | 80.18    | 13,242.50                       | 16,770.10    | 3,527.60   | .....    |
| 45  | Agents and clerks.....                    | 9,170.83                | 8,762.63    | .....   | 408.00   | 45,354.15                       | 44,778.51    | .....      | 1,075.64 |
| 48  | Porters and watchmen.....                 | 2,440.90                | 2,619.79    | 178.89  | .....    | 12,204.50                       | 12,858.92    | 654.42     | .....    |
| 49  | Telegraph and telephone.....              | 532.66                  | 564.22      | 31.56   | .....    | 2,663.30                        | 3,092.81     | 429.51     | .....    |
| 52  | Foreign agencies.....                     | 1,711.66                | 2,156.25    | 444.59  | .....    | 8,558.30                        | 10,285.98    | 1,727.68   | .....    |
| 53  | Loss and damage.....                      | 250.00                  | 437.51      | 207.51  | .....    | 1,255.00                        | 2,401.06     | 1,151.06   | .....    |
|     | Total.....                                | \$25,678.19             | \$25,502.30 | .....   | \$175.89 | \$128,890.95                    | \$137,490.67 | \$9,099.72 | .....    |

meeting of the heads of the departments presided over by the general manager with the superintendent as vice president. At these meetings each departmental head, in turn, went over the comparative statement of the expenses for which he was responsible, principally to explain why he had exceeded the amount he had estimated for any particular item. In making these explanations, it was found advisable to have the treasurer, the comptroller, the purchasing agent and the auditor of expenses present, and to keep minutes of the proceedings.

As a stimulus to these exercises and to make the responsible officials feel personally interested in the results, it was understood that each of them who kept within his annual estimate should receive a certain increase of salary, and that if the company earned a dividend of 7 per cent. on the year's business they should all receive an additional amount whether the estimates were exceeded or not.

This experiment went into effect in the year 1881, and after another year's experience we were so well satisfied with it that we tried the same plan on the Charleston & Savannah Railway, a road which connects at Savannah with the Savannah, Florida & Western Railway. To arouse still further the spirit of emulation the monthly statements of expenses of both roads were reported at a meeting where the officials of both were together assembled, and each member present was permitted to ask any questions concerning the details there submitted and explained. Little by little, other matters connected with the operations of the two roads were talked about and discussed at these meetings in an informal way until it occurred to the two superintendents and the general manager that here was offered an opportunity for obtaining assistance in matters outside of expenditures, and we at length formally organized what is now known among us as the advisory board to the general manager.

Before describing the organization and proceedings of

this advisory board, I would refer to the budget for 1884, for the Savannah, Florida & Western Railway. (See Statement "A.")

The amounts appropriated respectively for the several departments were as follows :

|   |                       |
|---|-----------------------|
| For administrative department.....      | \$169,680.00          |
| “ roadway “ .....                       | 393,928.80            |
| “ locomotive “ .....                    | 348,156.00            |
| “ car “ .....                           | 240,096.00            |
| “ transportation “ .....                | 243,564.00            |
| “ freight and passenger department..... | 308,138.28            |
| Total.....                              | <u>\$1,703,563.08</u> |

To this amount was added the cost of 1,650 tons steel rails and fastenings, being the allowance for annual renewals, whatever the cost might be. As already stated, the detailed estimate in each department was divided into 12 equal monthly parts, as shown in "Statement A," for the purpose of frequent comparison with the actual expenditures.

The cost of annual rail renewals (1,650 tons) and of the accompanying fastenings is not included in the subdivided estimates. The distribution of some of the items is not in accordance with general practice, but there are good reasons for this divergence, growing out of the necessity for classifying such items in each department as were controlled by its responsible head.

In these estimates some of the items could be estimated with approximate accuracy ; others were based upon the experience of previous years. The expenditures in some of the subdivisions vary considerably in different months, but this was kept in view by carrying forward from month to month the aggregate sum of the estimated and of the actual expenditures as each monthly comparison was made.

The comparison for the month of May, 1884, was as follows :

| Department.           | Expenditures. |           | Over. | Under.   |
|-----------------------|---------------|-----------|-------|----------|
|                       | Estimated.    | Actual.   |       |          |
| Administrative.....   | \$14,140      | \$12,173  | ..... | \$1,967  |
| Roadway.....          | 32,827        | 28,612    | ..... | 4,215    |
| Locomotive .....      | 29,013        | 25,226    | ..... | 3,787    |
| Car.....              | 20,008        | 19,635    | ..... | 373      |
| Transportation.....   | 20,297        | 19,022    | ..... | 1,275    |
| Freight and pass..... | 25,678        | 25,502    | ..... | 176      |
| Total ... ..          | \$141,963     | \$130,170 | ..... | \$11,793 |

The result for the five months ending May 31, 1884, was as follows :

| Department.           | Expenditures. |           | Over.   | Under.  |
|-----------------------|---------------|-----------|---------|---------|
|                       | Estimated.    | Actual.   |         |         |
| Administrative.....   | \$70,700      | \$68,730  | .....   | \$1,970 |
| Roadway.....          | 164,137       | 155,373   | .....   | 8,764   |
| Locomotive.....       | 145,065       | 135,259   | .....   | 9,806   |
| Car.....              | 100,040       | 99,247    | .....   | 793     |
| Transportation.....   | 101,485       | 108,112   | \$6,627 | .....   |
| Freight and pass..... | 128,391       | 137,491   | 9,100   | .....   |
| Total ... ..          | \$709,818     | \$704,212 | .....   | \$5,606 |

The manner in which the detailed monthly comparisons are made will be seen from the comparison for May, 1884, given in "Statement B," of the expenditures of the freight and passenger department.

The benefits derived from calling the heads of departments into council with the responsible management to consider matters pertaining to expenditures, led, as already mentioned, to a still further expansion of the idea, by the establishment of an advisory board to the general manager.

The organization of this board and its functions are stated in its constitution and by-laws as follows :

CONSTITUTION AND BY-LAWS OF THE ADVISORY BOARD  
TO THE GENERAL MANAGER OF THE SAVANNAH, FLOR-  
IDA & WESTERN AND CHARLESTON & SAVANNAH RAIL-  
WAYS.

CONSTITUTION.

ARTICLE I.

SECTION 1. This body shall be known as the Advisory Board to the General Manager.

SEC. 2. This board shall consist of the following officials of the several railway lines under the Plant system :

Superintendents.

Assistant superintendents.

Chief or consulting engineers.

Comptrollers.

Treasurers.

Masters of roadway, or roadmasters.

Masters of machinery.

Masters of transportation.

General freight agents.

General ticket or passenger agents.

Purchasing agents.

Auditors.

Assistant general counsel.

ARTICLE II.

The purposes in establishing this board are to secure better methods in railway administration ; to analyze expenditures and to locate the responsibility therefor in the several departments ; to give the officials in the system a knowledge of the operations of the various departments for their more perfect information and understanding of the details of the system of railway management ; to enable them from such knowledge to give such aid and assistance to the management of the line as is sought to be accomplished by this association, and to a more perfect working of their own departments.

ARTICLE III.

Of this board the general manager shall be president "ex-officio," and will occupy the chair at meetings when he thinks proper to do so.

ARTICLE IV.

Any action had by this board in matters affecting the administration of the affairs of the railways must have the sanction of the general manager to become of force in operation.

ARTICLE V.

This constitution can be altered by a two-thirds vote of the board, with the approval of the general manager.



## BY-LAWS.

I. There shall be a meeting, on the last Friday in each month, to be called by the president, or in his absence by the chairman last presiding.

II. Monthly meetings may be postponed or dispensed with by order of the president.

III. Special meetings may be called when deemed advisable.

IV. The superintendents of the several lines, now or hereafter connected with this system, shall be vice-presidents of this board, and will preside over the meetings, in rotation when the chair is not occupied by the president.

V. The president shall appoint a permanent secretary, in whose absence the chair will appoint a secretary *pro tem*.

VI. Order of business.

1st. Reading and confirming proceedings of the previous meeting.

2d. Presentation of reports of expenditures in the several departments of each road in the system, in the following order: roadway, locomotive, car, transportation, and freight and passenger.

3d. Reports of standing committees.

4th. Reports of special committees.

5th. New business.

VII. For each road there shall be a standing committee of three, known as the "committee on distribution of accounts."

VIII. These committees shall be composed of the comptroller, treasurer and purchasing agent, or, in the absence of any of the above offices on any road, the vacancy may be supplied by the superintendent in charge.

IX. Heads of departments will refer to this committee their monthly reports of expenditures, with such explanations as they desire to make.

X. Reports of the expenditures in the several departments will be submitted by the chairman of the standing committee for each road.

XI. All questions of dispute as to a charge shall be referred to this committee, whose action shall be final, unless modified at the next meeting of the board.

XII. Special committees will be appointed by the chair to consider matters of interest to the board.

XIII. All motions before the meeting must be made in writing.

XIV. New subjects, where they cannot be disposed of, will be referred to committees for report.

XV. The difference between the accepted estimate and actual expenditures in each sub-division of accounts shall be carried forward by the respective heads of departments from month to month until the end of the year, when the result of the year's operations will appear.

XVI. Whenever required by the president, heads of departments shall submit estimates of expenses for their several departments for such period in advance as he shall desire.

XVII. These by-laws can be altered by a majority vote of the board at any regular meeting.

*Amendments.*

1. There shall be regular standing committees on constitution and by-laws, administrative department, roadway department, machinery department, transportation department and freight and passage department, to whom shall be referred monthly all matters pertaining respectively to these departments.

2. A record shall be kept by the secretary giving in numerical order the several measures passed by this board. As each measure shall be put in effect by a general order, the same shall be made a part of the record.

3. Thirteen members shall constitute a quorum.

4. Roberts' Rules of Order are adopted as authority.

5. Whenever the report of a committee necessitates the publication of an order to carry it into effect, the report shall be in the form of the necessary order. When an order is not necessary, the adoption of a report shall be sufficient, but such report shall be approved by the president of the board and duly recorded in the minutes; the secretary shall then notify the parties interested.

The operations of the advisory board can be understood better by a perusal of the monthly proceedings than in any other way. I have therefore included the minutes of the meeting held in May, 1884 :

SAVANNAH, GA., May 30, 1884.

Regular meeting of advisory board to general manager, called to order at 9.30 a.m., C. S. Gadsden, superintendent Charleston & Savannah Railway, vice president, in the chair.

Present following members from Savannah, Florida & Western Railway :

R. G. Fleming, superintendent; F. S. Prendergast, chief engineer; W. P. Hardee, treasurer; W. B. McKee, comptroller; Geo. W. Haines, assistant superintendent; H. W. Reed, master roadway; G. M. D. Riley, master machinery; O. W. Jackson, master transportation; J. L. Taylor, general freight and passenger agent; H. H. McKee, auditor expenses; C. T. Morel, auditor earnings; A. A. Aveille, purchasing agent. S. T. Kingsbery, assistant general counsel, reported at 10.25 a.m.

And from the Charleston & Savannah Railway :

J. Moultrie Lee, treasurer; H. A. Ulmo, master machinery; J. W. Craig, master roadway and transportation; S. C. Boylston, general freight and passenger agent; E. P. McSwiney, auditor expenses.

Minutes of previous regular meeting and of the special meetings of April 24 and May 5 were read and confirmed.

Reports of expenditures in the several departments of the Charleston & Savannah and Savannah, Florida & Western Railways were read and accepted.

## REPORTS OF STANDING COMMITTEES.

*Committee on By-Laws*

"In what place, in the order of business, should unfinished business be considered."

The committee respectfully report that our rules of order provide for this. See order of business page 115, Roberts' Rules of Order. Adopted.

*Committee on Administrative Department.*

"Payment of wages by discharge ticket." Report following order: "Discharge tickets will be paid by the paymaster upon the approval of the head of department issuing the ticket." Adopted.

"Preservation of records." Presented plans and estimate for a fire-proof vault, and recommended that it be built not less than 60 feet east of the general office building as shown in diagram. Adopted.

*Committee on Roadway.*

"Special compensation to section foremen, etc." The report presented by the committee at previous meeting having been printed and distributed in accordance with resolution then passed, was taken up and adopted with additional report that the cost of premiums to each company will be, for Savannah, Florida & Western Railway:

|                         |       |
|-------------------------|-------|
| Annual premiums.....    | \$450 |
| Quarterly premiums..... | 900   |

|                      |        |
|----------------------|--------|
| Total per annum..... | \$1350 |
|----------------------|--------|

For the Charleston & Savannah Railway:

|                         |       |
|-------------------------|-------|
| Annual premiums.....    | \$170 |
| Quarterly premiums..... | 360   |

|                      |       |
|----------------------|-------|
| Total per annum..... | \$530 |
|----------------------|-------|

Were granted further time to report on "specification for trestle bridges;" "standard yard switch;" "fence law;" "location of waterways."

*Committee on Machinery.*

Were granted further time to report on "drawing standard plan for releasing air brakes;" "adoption of Congdon brake shoe;" "standard wheels and axles;" "standard freight cars;" "passenger car specifications—ventilation;" "plans for machine shops;" "locomotive specifications—driving-wheel tires."

"Locomotive specifications—oil feeders." Presented following report, which was on motion received as information. "After careful examination of construction and working of different styles of oil feeders, and correspondence in relation to experience of leading railroads, and upon our own experience, they recommended that some form of plunger cup be used and preferably the 'Dreyfus cup.' They recommend phosphor-bronze bearings instead of brass, also the abandoning of Babbitt metal in the bearings, as they consider that

Babbitt metal is liable, with very little heat, to stop up the feed tube of oil cups. They recommend the solid-end rod in place of strap keys, etc."

"Wages of mechanics." Presented a tabular report of wages paid by Savannah, Florida & Western, Charleston & Savannah Railways, South Carolina and Central Railroads, which was received as information.

#### *Committee on Transportation.*

Were granted further time to report on "railroad legislation—laws of Georgia, Alabama, Mississippi and United States as to running of railway trains" and "trains breaking loose—best means of prevention."

#### *Committee on Freight and Passage.*

Were granted further time to report on "extent to which common carrier is protected where bill of lading provides that, in event of loss by fire, the common carrier and its connections shall have the benefit of any insurance the shipper may have effected thereon" and "liability of railroad companies as common carriers;" "claim agency as a bureau of the general manager's office," "general agency expenses" and "transportation of high explosives."

The committee recommend: 1. That the following items of expense of general agency shall be borne by the entire system: Salaries of agents and clerks, and office rent and expenses at Boston, New York, Philadelphia and Baltimore; printing and stationery; advertising; traveling expenses. 2. The basis of division shall be the gross earnings of each member of the system for the previous year. 3. The accounts shall be rendered monthly by the comptroller of the Savannah, Florida & Western Railway. 4. That the South Florida Railroad and the People's Line of Steamers shall contribute on same basis as the other members of the system. Adopted.

#### *Committee on Distribution of Accounts.*

"Division of salaries of agents and clerks on line of road between freight and passenger accounts." Presented report, which, on motion, was recommended for a more distinct and full report.

### REPORTS OF JOINT COMMITTEES.

#### *Joint Committee on Roadway, Transportation, and Freight and Passage.*

"Plan for standard warehouse for small stations." Presented a plan, which was adopted.

#### *Joint Committee on Roadway and Transportation.*

"Method in use for paying and provisioning hands; precautions taken for security of pay-roll money and provisions in transit; order to cover same." Presented a report, which was rejected on the adoption of a minority report offered by Mr. Reed as a substitute, and as follows:

"The minority of your committee beg leave to report that the present system of paying and rationing on the line of the Savannah, Florida & Western Railway be continued in force for the following reasons: 1. The present system of paying and rationing has given

perfect satisfaction, and it is doubtful if our present thorough organization could be maintained if the system were changed. 2. The expenses of paying and rationing by any other method than that at present employed would not be the means of reducing the expenses of this particular service. It is further recommended that the pay car, its armament, and the safe be examined and placed in as secure and perfect a condition as possible by the purchasing agent."

Were granted further time to report on "Plans and estimates for improvements at Southover Junction."

"Plan and estimate for proposed side track at Southover Junction." Presented plan and estimate, which was adopted, and recommend that the work be commenced immediately.

"Rules to govern draw-bridge tenders." Your committee beg leave to report that such an order is already prepared in our new train rules. Received as information.

*Joint Committee on Machinery and Transportation.*

Were granted further time to report on "Record of wheel mileage;" "standard cab car;" "inspection of foreign cars at junction points;" "standard style of fire-extinguisher."

*Joint Committee on Transportation, Roadway, and Freight and Passage.*

"Refrigerator cars." The committee beg leave to report that they find the weight of the various classes of refrigerator cars, when loaded with perishable freight, is not greater than the standard box cars of these companies when loaded to their utmost capacity; also that the method of carrying ice in the upper part of these cars and the usual weight of such cars has not rendered them unsafe to handle in our trains. Our experience proves that we have had only one accident from this cause since these cars commenced running on our roads. This accident happened several years ago on a stringer track on the Albany division. They fully indorse the report of the standing committee on freight and passage herewith, as made at the February meeting, viz.: that the freight department be instructed to assess the weight of freight loaded into refrigerator cars at 50 per cent more than the actual weight of the articles themselves, and that charges be made on assessed weights. This action is based on the additional dead weight necessarily carried—four to five tons in weight of car and three tons in ice—and upon the fact that these cars are almost invariably handled empty when south bound, at a cost of three quarters of a cent per mile car mileage, and are very often returned north bound empty at a similar rate of car mileage. The committee consider the transportation of perishable articles in refrigerator cars a very expensive method for the railroads hauling same, as it is entirely different from the ordinary manner of handling similar shipments; and they believe the additional charges herein recommended for this extra freight service are just and reasonable rates.

By Mr. Boyleston: *Resolved*, That the report of the committee on refrigerator cars be referred to the assistant general counsel to frame the principles therein laid down in conformity to law." Carried.

*Joint Committee on Transportation, Machinery, and Roadway.*

Were granted further time to report on "Trespassers on track; rule to protect company."

*Joint Committee on Transportation and Machinery.*

"Reduction stock of car wheels." The committee report: There are in use on the Savannah, Florida & Western Railway—

No. 1 passenger axle with journal  $3\frac{1}{2} \times 8\frac{1}{2}$ , collarless.

No. 2 passenger axle with journal  $3\frac{1}{2} \times 7$ , collarless.

No. 3 freight axle with collar journal  $3\frac{1}{2} \times 7$ .

No. 4 passenger axle with journal  $3\frac{1}{2} \times 5\frac{1}{2}$ .

No. 5 freight axle with journal  $3\frac{1}{2} \times 5\frac{1}{2}$ .

No. 6 passenger axle with journal  $3\frac{1}{2} \times 5$ . (C. L. cars.)

On Charleston & Savannah Railway—

No. 7 passenger axle with journal  $3\frac{1}{2} \times 6$ .

No. 8 freight axle with journal  $3\frac{1}{2} \times 6$ .

The lengths of these are different.

The Savannah, Florida & Western Railway has commenced the substitution of standard freight trucks with No. 3 axles for those requiring No. 5 axles, and the supply of No. 5 for renewals is drawn from discarded trucks; thus the purchasing agent is not required to keep No. 5 in stock. The No. 2 journal is being substituted by No. 3. The committee recommend that No. 4 be treated similarly to No. 5, as also the Charleston & Savannah No. 8 journal; that is, when one of these wheels or axles gives out, a standard freight truck with No. 3 journal should be put under that. The remaining good wheels and axles of No. 8 should be used for renewals.

It is not considered advisable to pursue this plan with standard No. 7 of the Charleston & Savannah Railway, as this would necessitate throwing away trucks recently overhauled and worth, say, \$600 or \$700 per car. There are eight of these cars in service.

These recommendations will involve keeping Nos. 1, 3, 6, and 7, making four styles of axles of which a supply will have to be kept in stock, against eight at present. Of these Nos. 6 and 7 will require a very small stock, as there are but two cars fitted with No. 6 style and eight with No. 7. The committee recommends that these two last-named styles of axles be eliminated as soon as possible, either by selling the cars or replacing their trucks by standard ones whenever they require general repairs. Received as information.

*Joint Committee on Transportation and Freight and Passage.*

Were granted further time to report on "Fire apparatus; Harden hand grenade."

*Joint Committee on Freight and Passage and Transportation.*

"Transportation of live stock." The committee recommend that the regulations now in force on the Savannah, Florida & Western Railway be extended to cover the roads in the system. Adopted.

Were granted further time to report on "Passage regulations;" rule to govern opening of ticket offices and duty of conductors where passengers have taken a train which does not stop at the station to which they desire to go."

## REPORTS OF SPECIAL COMMITTEES.

"Garnishments." Committee respectfully report that they have conferred with Messrs. Chisholm & Erwin, who advise that garnishments can only be served on the vice-president; they also recommend the cancelling of superintendent's order No. 21, as contained in time table No. 19. The committee have also conferred with Messrs. Brawley & Barnwell, who say that in South Carolina an attachment can be served on president, superintendent, secretary, cashier, or managing agent, and that as proceedings are often complicated and irregular, they advise that all papers of such nature be referred to them. Adopted. J. M. Lee, chairman.

"Authority for heads of departments to inflict penalties." Committee respectfully report the following order: "Section 4, paragraph 1, of general manager's order No. 5, is hereby amended to read 'In the current series of orders from general manager and superintendent, also all orders issued or authorized by heads of respective departments.' For application of this order see 8th paragraph of order No. 5. Adopted. George W. Haines, chairman. "Advisability of keeping records of discharged employes," granted further time.

## NEW BUSINESS.

J. Moultrie Lee, chairman committee on constitution and by-laws, gave notice that at next regular meeting the committee will move to amend by-law No. 6, so as to read: "Fifth, unfinished business; sixth, new business. This is done to conform to rules of order adopted by the advisory board.

By Captain Fleming: "Whereas, the giving of credits to heads of departments on monthly expenses of their departments does not in any way decrease such expenses.

"*Resolved*, That from this date no credits be allowed, but heads of departments shall furnish to committee on distribution of accounts an explanation of all discrepancies between the monthly estimates and the actual expenditures."

On motion of Mr. Boyleston, laid on the table to be taken up with special report of Mr. James L. Taylor on the principles which should govern committee on distribution of accounts in passing on expenditures, etc.

The chairman of the committee on freight and passage returned the report of the joint committee on freight and passage, and transportation, in relation to "collecting fares or tickets in sleeping cars," which had been transmitted to the general freight and passenger agents of the companies to be complied with, with the following endorsement: "Respectfully returned to secretary of advisory board. Your committee have deemed best not to issue the instructions indicated in these papers, the superintendent of the Pullman Palace Car Company having formulated a system and issued instructions very similar to these and obtained consent of all lines between New York and Jacksonville thereto, thus making the system uniform on the entire line." Received as information.

There being no further business, meeting adjourned at 12.55 P.M.

WILLIAM B. McKEE, Secretary.

I have here given *in extenso* an account of our experiment in what may be termed co-operative management, from its beginning as a corrective to injudicious expenditures, until it has broadened out into the "Advisory Board" and has become an essential factor in the operation of our system of roads.

The immediate results have been, as already stated, eminently satisfactory. It has brought together the department officials of the several roads in the system to advise for the general good. Through the opportunity thus afforded for an interchange of views on matters connected with the operations of our roads, they have learned how each department may obtain valuable aid and information from the experience acquired in other departments. We have insured an intelligent development of our methods which has kept them abreast of the best recognized practice elsewhere, so far as it is adapted to our surroundings, and in many ways which I will not attempt further to describe, it has been of valuable assistance to the responsible management. In fact, it has virtually become a part of the responsible management itself.

When it became evident last spring that business would be dull during the summer we considered it advisable to reduce our expenses for a definite period by an assumed percentage. The actual reduction upon this basis for each department was then figured out, and each head of department accordingly notified as to what was expected of him. They, each of them, sent in a proposition as to how they proposed to effect the reduction as required. With some modifications these propositions were approved, and the results as estimated were obtained without that annoyance and friction which had accompanied previous reductions when the whole responsibility had to be borne by the general manager and superintendents.

Railroad managers are not born to their positions; they usually reach them through some one of the operating departments. If such promotion comes to a man whose



life-long experience has been with machinery, or on the track, in train service, or in a freight office, he must be more or less one-sided when he becomes responsible for all the operating departments. His intellectual efforts will be expended in the line of least resistance and he will have to guard against meddling too much with the affairs of that department in which his reputation was gained and against neglecting those in which his experience has not been so great.

The advisory board affords just the training to remedy such defects. In committee and in discussion at the monthly meetings each member gets an insight into the workings of departments other than his own, which must tend to prepare him for promotion if he be otherwise fitted for it.

There is a still larger view which may be taken of the federative plan of managing separate corporations ; one which includes their relations with the state governments which have created them.

No thoughtful person can look with unconcern upon the growing estrangement between the public in general and the corporations which control the railroad system of the United States. Unless this condition of things can be remedied, unless a way can be contrived by which the public can be satisfied that the private ownership of railroads is compatible with the general welfare, the conclusion seems indisputable that the private ownership of railroads must cease. How it is to be terminated is another matter. A variety of ways suggest themselves, varying from absolute confiscation to the purchase at a fair price by the state from the private stockholders. In any event state control means state management. It means that about one million of American citizens employed upon railroads will become the servants of the political party in power ; that vacant positions will be filled by political favorites and not in accordance with a stern disregard of aught save suitability which is characteristic of the

best modern railway practice ; that red tape will reign supreme and will repress the spirit of progressive improvement which existing competition has fostered ; that claims for personal injuries, for alleged breaches of contract, and for other wrongs against private individuals will, when brought to trial before a jury, receive a different sort of consideration, when the taxpayers must ultimately pay the damages, than when they are to be extracted from the treasury of " a soulless corporation."

It is unnecessary to enlarge upon the effects of state control. It has been tried time and again in this country and invariably with the same result. A disgusted legislature has been glad to dispose of the property, either by sale or lease, to private parties.

The prevailing dissatisfaction with the private ownership of railroads is partly factitious and is partly justifiable. Several causes have contributed to it. The competition of rival lines for the business of the same town or region has brought about a reduction of rates below a profitable point ; the inevitable restoration of rates has led to an outcry from those who had been benefitted at the expense of the suffering stockholders. State control would stop this business by a cast-iron freight tariff which it would take no little amount of legislative lobbying and wire-pulling to modify.

Then too, one city become jealous of another. Its citizens think that the other is stealing its trade, and immediately look to their railroad connections for protection ; not to put the one market on an equality with the other but to give it an advantage in rates, no doubt again at the cost of the stockholders. Here also state control would intervene and put a stop to such ill-advised competition, unless state pride could also be aroused, and the taxpayers of each state become interested in a border warfare. At points where competition can exist the people think that for this very reason they should have lower rates than their less favored neighbors and resent the

efforts of the several companies to restrict competition by means of traffic agreements.

On the other hand the merchants in a town dependent on a single railroad can not be convinced that it is right to make them pay more for this reason. They think that the demands of competitive points should be disregarded until such time as they get another road built to their own town. A state management would settle this dispute in but one way. It would establish certain rates for certain distances and let the merchants fight it out among themselves. If under such a ruling one of two roads lost much business the taxpayers would make good the difference. A management responsible for dividends to stockholders can not afford to do this. It must see to it, that a market upon which it is dependent for patronage does not lose trade so long as that traffic can be handled with a margin for profit, and that local industries must not be swamped or absorbed by a rival at competitive points. In a word, the officials who are responsible for the proper conduct of the traffic of a railroad must be sensitive to every wind that blows ; they must know the tendencies of trade as well as the merchant, and must stand ready to protect the business of their customers to the point where it can only be protected at a loss to stockholders. This is generally the case to an extent not comprehended by those whom they protect, and who apparently consider any freight rate too high if its reduction would add either to their trade or to their profits.

This matter of rates is then one of the causes of dissatisfaction with the private ownership of railroads above alluded to. Either there must or there must not be competition in rates.

It is difficult to conceive how this competition under state control can be readily adjusted to the fluctuating demands of commerce throughout the United States. Thirty or forty sets of state commissioners would muddle the situation beyond conception and the end would be an un-

variable scale of rates for distances, the last refuge for inexperienced minds overwhelmed with the confusion and dissatisfaction which they themselves have wrought.

Another cause of public dissatisfaction which may well be called factitious, is the prevalent opinion that railroad officials are oppressive and tyrannical. As these officials are as much amenable to the law as any other class of citizens—and perhaps a little more so—it is difficult to understand just what is meant by the expression of such an opinion. It probably means that they are disposed to disregard the rights and feelings of persons who have business with them. Now, how one man will treat another depends very much on his own disposition. If he is naturally brusque or haughty, his official behavior will show it.

But the greater part of any railroad official's intercourse with the public is of necessity through the medium of a written correspondence. That official correspondence is apt to be brief rather than diffusively polite goes without saying. That every man's business with a railroad official cannot be disposed of summarily without investigation and to the exclusion of all other business is equally true. It may well happen that with the many demands upon the time of one overburdened official, his replies to correspondents may be brief to rudeness or delayed to a point that tests the temper of his correspondent ; but this might just as well be the case if the official served the state as if he served a private corporation. The difference is that in the one case an appeal to the law would serve the injured correspondent, if he really had a grievance, in quite another fashion than in the other.

The purpose of a railroad is transportation. It involves, daily, thousands and thousands of transactions between the railroads and the public which are in fact the contracts of a common carrier. If these railroad officials were justly chargeable with a disregard of the rights of those with whom they come in contact, certainly it would

be more apparent in their many dealings of this kind than in any other way. What is the experience of any railroad official? How much of the litigation which renders it necessary for a railroad corporation to have an organized legal staff, is in cases where the law of common carrier is involved? It will be found that it is but a small proportion of the total railroad litigation which takes up the time of the courts. Claims for overcharge, for loss or damage of goods are adjusted in behalf of the company by experts who must in the majority of cases give satisfaction to shippers or there would be more litigation of this kind than there really is.

It is not to be asserted that many such cases do not come to trial because of the difficulty in obtaining justice. Let the claim be of a different kind; let a farmer's cow be killed or a passenger slightly injured and what difficulty does the plaintiff find in getting redress through the courts? How the court house will ring with invective against the domineering, extortionate, oppressive and tyrannical corporation whose engine-driver did not stop his train in time for the cow to step off the track, or whose conductor, through neglect or violation of the company's rules, brought about the injury to the person complaining. Now, the sympathy of cattle owners on the jury will be appealed to in valuing the stray beast or in diagnosing the internal injuries of the plaintiff whose sufferings will cease only when the verdict is announced. This sham of holding up a railroad corporation before a jury as the embodiment of extortion, oppression and disregard of law and morals has been worn so threadbare that the lawyers can hardly keep from laughing while they are in the act of using it; yet it serves the purpose well and it is at the bottom of much of the prejudice against railroad corporations. It has lent itself readily to political demagogues as well. It may justly be denounced as the means for extorting money from railroad companies since many a claim for injury, either personal or to live stock, which is

without a shadow of justice, is settled by compromise before the railroad will spend time and money in an appeal for justice where justice cannot be hoped for.

Is there not ample reason for saying that public dissatisfaction with the treatment of these claims of individuals by railroad officials is factitious and that there is more reason for complaint on the part of the railroad corporations? Let the state once own the railroads and how the situation will change!

We now come to some reasons for objection to private ownership of railroads which are better founded. There can be no just cause for complaint if a company, which gives good service, earn large dividends upon money actually invested in its property. Judicious investment of private capital in public works is for the general good: it tends to increase the general prosperity. The notion that a railroad company should not earn more from the capital risked in such a venture than the rate of interest which a bank may lawfully charge for a loan upon unquestionable securities, is absurd. The regulation of railroad rates upon such a basis is unjust unless the state is prepared to guarantee dividends upon the capital stock and bonds at the lawful rate of interest. State interference with railroad rates, without such a guarantee, is rank injustice, and will surely deter further investments in railroad enterprises. The ground for public complaint is good where the company undertakes to pay dividends on stock which does not represent money actually invested. To my mind the complaint is a righteous one, and the extent to which this evil has been carried has been the occasion in a great measure of the present unsatisfactory condition of affairs.

If the railroad property in the United States was to-day capitalized for the money actually invested in it—wisely or otherwise—and the managements had been left to make their own rates, I believe that the people would have lower rates and be better accommodated; the stock would be above par, and the railroad employees would be

better paid. I believe that this watering of stock is at the foundation of all our troubles, and that if it had been prevented by law there would have been but little need or demand for other railroad legislation.

Those who have been the foremost in this practice are not the most to blame for it. Some things forced them to it ; other things favored it.

The stockholders in the older and smaller railroad companies suffered by the unrestricted competition which existed before pools were thought of. Ill-advised investments in unproductive railroad enterprises ended in bankruptcy, and the courts led the way to watering stock by appointing receivers to operate railroads, and by transferring a railroad franchise through the foreclosure of a mortgage. No wonder that stockholders lost faith in the final outcome of an enterprise and sold out at panic prices when dividends were not forthcoming !

Suppose that our courts had adopted what we understand to be the English practice ? Suppose that they had held the franchise inviolate in the corporation, and that only the profits could be mortgaged and be administered by a receiver ? The stockholders would then have been responsible to the courts for an honest and faithful management of the property ; the track, bridges and equipment would have been maintained in good order and with due regard for the lives of passengers ; the rates would have been high enough at least to secure this result ; or the court would not have permitted the road to be operated. Only the net earnings would have been at the disposal of the company's creditors. The property itself would not have been wasted away. How the stockholders and bondholders would have adjusted their affairs in the courts it is not my purpose to discuss. The English people have found out the way while with us the watering of stock has ensued mainly as a sequence to the transfer of a franchise from one railroad corporation to another by legal foreclosure and sale.

The next circumstance which I will consider as leading the way to issuing fictitious stock, is the consolidation of railroad corporations. When such consolidation included corporations in different states, the way was opened for a new batch of legal complications arising out of conflicts of state jurisdiction, difference in laws, etc., which has burdened the United States courts with litigation which would have been spared them if each state had held its own domestic corporations strictly within its own jurisdiction. By missing this opportunity the way has been opened for the consolidation of state charters into corporations extending through many states, and for stock schemes as incidental to this mighty expansion, which have loaded the properties with burdens beyond their power to carry.

The ostensible reason for the creation of these mighty consolidations is the better and more economic service that could thereby be rendered to the public, and this reason would be valid if this service could not otherwise be rendered.

It seems to me that the federative plan of managing separate corporations provides for the increased efficiency of service sought for by corporate consolidations, while it obviates the objections to which that plan is open.

Each railroad company might retain its own corporate existence and local management and yet be represented for the general good in a system comprising many corporations.

The local management could then be kept in accord with its local patrons, while under a great consolidation the responsible management may be a thousand miles away, and the complaining voice may die into silence without even an echo reaching the ear of him who alone can apply the remedy. The stock of each corporation could be kept apart from the others and held in varying proportions by different persons. The dividend-paying stocks would again become attractive as investments among local stockholders,



with the benefit of having residents along the line interested in maintaining pleasant relations between the corporation and the public. But when stock in a well located road is liable to be merged into the stock of another whose end is bankruptcy, small shareholders disappear, and the stock aggregates in large "blocks," better suited for speculative purposes and for making "corners" in Wall street.

The making of local rates and the control of all matters in which the interest of other roads in the system were not involved should remain with the local management. The authority of the superior or supervising management should attach only to the traffic between the roads in the system or with outside corporations. This superior management could establish at convenient points works for building locomotives, cars and certain other equipment and supplies, in which the several corporations were interested as shareholders, paying for what they got at market prices and receiving their profits in the shape of dividends. Such an organization would take the place of the centralized management of a consolidated system without being loaded down with the determination of a multitude of problems which could be, in every way, better disposed of by a local management; and being thus relieved it could the better consider those larger questions, technical and administrative, which call for a broader treatment than they are likely to receive from a general manager and his staff with what is now expected of them.

I have not undertaken in this article to embody all the reasons which recommend to my mind the system of management which I have here indicated in outline.

To the stockholder who is desirous of reasonably certain dividends; to the railroad manager who will part with the shadow of autocratic power for the sake of more efficient control; to the political economist who seeks the surest means of increasing the nation's wealth; to the statesman who appreciates the necessity for maintaining

proper relations between the public and those who control their ways of transportation, this matter of efficient railway management is of importance.

I trust that this article thrown hastily together in the spare moments of a busy life offers some suggestions toward its solution.

## CLASSIFICATION OF FREIGHT RATES. JUST AND UNJUST DISCRIMINATION. AGREEMENTS FOR POOLING COMPETITIVE TRAFFIC.

(Statement made to Select Committee on Interstate Commerce, United States Senate, Forty-ninth Congress, First Session. Submitted to the Senate January 18, 1886.)

### UNJUST DISCRIMINATION AND EXTORTION.

It is common to couple the charge of extortion with unjust discrimination when exception is taken to railroad tariffs, but what is meant by extortion in this connection has not been clearly stated. Webster defines extortion as "the act or practice of wresting anything from a person by force, duress, menaces, authority, or by any undue exercise of power; illegal exaction; illegal compulsion to pay money or to do some other act." This definition seems to refer to the tyrannical conduct of a government official, in defiance of law, and its application to railroad tariffs seems inappropriate. The charge of unjust discrimination is capable of definite application to railroad rates. The expression "unjust discrimination" recognizes that discrimination may be just, and leads us to consider, first, as to what discrimination in railroad tariffs means, and then as to what constitutes unjust discrimination.

Discrimination is primarily a departure from uniformity. Uniformity in its simplest form would be the transportation of every kind of freight for any distance, over one or more roads, at the same rate.

But lumber and feathers have not a uniform weight as compared with their bulk, nor a uniform value, and if a uniform rate were to be applied to both, the lumber shipper would claim that the rate must be so fixed that he could ship lumber with a margin of profit, and the shipper of feathers would be well satisfied with the same rates. Therefore the public is not interested in having a classified

freight tariff so long as the uniform rate applied to all articles will permit the profitable shipment of the heaviest, bulkiest, and least valuable of them. Why, then, are freights classified at all, since the public could be equally well served by a uniform rate? The answer is that unclassified rates would not be "just and reasonable" to the carriers—that goods should be classed with a view to their weight, value, and convenience for handling, in order that the carrier may get a larger profit out of transporting silks and other light and costly articles, and thereby be enabled to charge a lesser profit on coal, lumber, and other articles of little value in proportion to their weight. Here is a plain case of discrimination against that class of citizens which manufactures, deals in, or purchases silks, spices, feathers, willow ware, &c., ostensibly to benefit the carrier, but practically for the benefit of that other class of citizens which produces, manufactures, deals in, or purchases lumber, coal, iron, &c. This fundamental departure from a strictly uniform tariff may be seen in its simplest form in the charter of the Georgia Railroad Company, which recognizes but two classes of freight: "heavy articles," to be carried by weight, and "light articles," to be carried by cubic measure.

After many years of differing views among railroad managers and of complaints and protests from shippers, each road or group of roads arrived at a classification which served its purpose and caused no complaint from local shippers; but when a shipment was to be made over several roads or groups of roads the varying classification caused inconvenience to the roads and annoyance to the shippers. The establishment of the Southern Railroad and Steamship Association was followed by the appointment of a committee from among its members which, after long deliberation, prepared a classification based upon the trunk-line classification in the Northern and Western States. Every road in the Association adopted it, making special rates for certain articles, such as lumber

on the sea-coast roads, coal and iron on the mountain roads, and oranges and early vegetables on the lines leading from Florida. When the Georgia Railroad Commission came into being it found a uniform classification already in existence, and very wisely refrained from any extensive meddling with it.

Besides charging different rates for different classes of goods, another departure from uniformity was made by charging different rates for transporting the same class of goods different distances, and looking from the shipper's side it is difficult to see the justice of this discrimination. Why should a farmer who lives 200 miles from Savannah pay more for having his cotton carried there than one who lives only 100 miles distant? The one gets no more for his cotton than the other, and yet he is discriminated against because he is so unfortunate as to live farther away from the market. There is more justice in such a position than will at first be admitted, and it has been recognized for many years in the transportation of fertilizers in the Southern States, evidently to the advantage of manufacturers and planters. This shows that if rates had originally been charged without regard to distance, as is still the case with river steamboat transportation, shippers would have had no cause to complain, so long as the uniform rate was low enough for profitable sale or use of the goods after reaching their destination. But there was more profit to the carrier in making two trips per day with the same engine and cars than in a single daily trip, or perhaps only one trip in two days; and here again, as with classifying goods, the original motive for discrimination was to favor the carrier; i.e., it was unjust and unreasonable to expect him to get no more profit out of a car loaded for a point two days distant than if it could be returned the next day, or perhaps the same day. This was probably the cause of discrimination for distance allowed in the Georgia Railroad Company's charter, which allowed an additional charge for every one hundred miles.

But after awhile the reason for this discrimination was forgotten, and the man shipping goods 50 miles thought it a hardship to pay as much as the man that shipped 100 miles. The man that shipped 10 miles would not pay more than if he shipped by wagon, and so the principle that rates should be somehow proportioned by distance got so well established that it became customary to place several stations lying consecutively together in one group for the purpose of making freight rates, although the same group would sometimes include stations lying 30 or 40 miles apart. This saved the railroad companies a multiplicity of rates, and the dealers at adjacent stations generally paid the same rates, so that it worked out satisfactorily to both parties.

The Georgia Railroad Commission has ignored this custom of grouping stations in making the standard tariff. Their rate on first class for 10 miles is 16 cents per 100 pounds ; for 20 miles, 20 cents ; for 30 miles, 24 cents ; so the man living 20 miles from Savannah pays 10 cents more per 100 pounds than he who lives 10 miles nearer, and 10 cents less than if he lived 10 miles further. But if he lived 250 miles from Savannah he will pay only 1 cent per hundred pounds more than his neighbor 10 miles distant on one side, and one cent per 100 pounds less than the neighbor 10 miles distant on the other side. The principle upon which this tariff is based cannot be ascertained from an examination of it; the ratio of increment of rates with each increase of distance is variable with each class of rates and for every distance. The rate on coal for 10 miles is 50 cents per ton, and for iron 80 cents per ton, so for 10 miles iron pays 30 cents (or 60 per cent.) more than coal does ; but follow the distance in each class out to 250 miles and the rate is the same for both articles, while for 350 miles the rate is 80 cents per ton more on coal than on iron. For some reason the ratio is so variable that the class of goods which for 10 miles paid 30 cents per ton more than the other, paid 80 cents less per ton

if both were carried 350 miles. I think that this class of discriminations originated with the Georgia Railroad Commission.

The next class of discrimination in rates is in permitting two corporations, each operating a road 100 miles in length, to charge, each of them, the 100-mile rate for freight passing over the entire length of both lines ; whereas if the same 200 miles of road had belonged to the same corporation the 200-mile rate would have been charged. For instance, referring again to the standard tariff of the Georgia Railroad Commission, goods in first class for 100 miles are charged at 45 cents per 100 pounds ; therefore, on a shipment over the Western & Atlantic road, from a point 100 miles west of Atlanta, to a point on the Georgia Railroad 100 miles east of Atlanta, each road would get, 45 cents per 100 pounds and the consignee would pay 90 cents ; but if both roads had belonged to the same corporation he would have paid 70 cents per 100 pounds. Why should the shipper in one instance be so much more favored than in the other ? There can be but one answer, viz., that the discrimination is in favor of the two corporations, and is rendered necessary because the tariff is based upon a scale of rates for distances, varying unequally as the distances increase. For instance, under the tariff of the Georgia Railroad Commission, goods in first class, shipped over 300 miles under one corporation, pay 80 cents per 100 pounds, but if the same goods were shipped the same distance for the same price over two roads, one of which was 200 miles long and the other 100 miles long, how is the amount to be divided ? Is the road over 200 miles long to claim the rate of 70 cents allowed for that distance and leave the other road only 10 cents out of the total 80 cents for its 100 miles ; or is the 100 mile road to claim the 45 cents allowed for that distance and leave the 200 mile road only 35 cents for double the distance ? This inconsistency can only be avoided by allowing each road to charge its local rates ; and here again,

to favor these two corporations, shippers are discriminated against in a way that they would not be if shipping the same distance over a single road ; or to state the same thing in another way, the commission considered it unjust and unreasonable to the railroads to require equal rates for equal distances under such circumstances.

The next class of discrimination is where equal amounts of goods of the same class are shipped equal distances over different roads. It would seem that in such cases the railroad commission should put a citizen living at Savannah upon an equality with a citizen living at Atlanta ; but if the latter ships second-class goods 100 miles out of Atlanta to a station on the Georgia Railroad he pays 40 cents per 100 pounds, but if the Savannah citizen ships the same goods the same distance on the Central Railroad he must pay 48 cents, or 20 per cent. more. The only reason that can be given for this discrimination is, that since the tonnage of the Central Railroad is less than that of the Georgia Railroad it would be unjust and unreasonable to require the former road to charge no more than the latter for performing the same service.

There is another class of discrimination which affects different quantities of the same class of goods shipped the same distance, known as carload rates. In these cases the shipper of a carload of the same articles to the same consignee is allowed a rate of 20 to 30 per cent. less than is charged to the shipper of a lesser quantity, for the reason that a full carload for the car is thereby insured, with the cost of only one entry on the way-bill ; considerations which seem to warrant the State commission in requiring the railroad company to do the same amount of work for less money for the one citizen than for the other. I have been particular in citing the rates made by the Georgia Railroad Commission as instances of that kind of discrimination which was not in the interest of the railroad company, since they were made by an official body appointed in the interest of the shippers, from whose decision there



is no appeal, and who have officially reported that by reduction in rates they have saved the people in one year an amount equal to the entire State taxes. It may therefore be fairly presumed that the discriminations embodied in their official freight tariffs cannot be considered as unjust toward shippers. What are the discriminations?

(1) That goods offered for shipment are classified; that is, that different rates are charged for different classes.

(2) That different rates are charged for transporting different goods for different distances.

(3) That the rate of increase in rates for distance is variable with each class of rates and for every distance.

(4) That the scale of rates for distance only applies to shipments over the line of one corporation, and is applied afresh to the same shipment when it passes on to the line of another corporation.

(5) That the scale of rates for distance may vary for different roads, as between a road with a light and with a heavy tonnage.

(6) That the scale of rates for distances may vary for different shippers, where one has a carload to ship and the other has not.

These principles have been applied by the Georgia Railroad Commission only to what is known as local business, or that for which there is no competition. They would be as applicable, under such conditions, to interstate commerce as to that which is contained within the borders of one State.

But the State commission before mentioned had to meet the requirements of competitive traffic. For instance, between Augusta and Savannah there were rival routes, one altogether within the State and the jurisdiction of the commission, and others which were not. The Georgia Central was permitted to charge 34 cents per hundred pounds, or about \$1.56 per bale on cotton from Augusta to Savannah, but the competition by a rival route through South Carolina prevented that company from getting any

cotton at that price. They could not get more, perhaps, than \$1 per bale. But, under the rules of the commission, if they adopted less freight rates from one station, they were required to make a reduction of the same per cent. at all stations along the line of the road, "so as not to make an unjust discrimination against any person or locality." So this company could not lower its rates on cotton from Augusta one-third without reducing its cotton rates one-third from every other station on its line. Whereupon the railroad commission issued an additional order, as follows :

"Competing lines not all within the jurisdiction of the commission. When, however, from any point in this State there are competing lines, one or more not subject to the jurisdiction of the commission, then the line or lines which are so subject, and are working at the lowest rate under the rules, may, at such competing point, make rates below the standard tariff to meet such competition without making a corresponding reduction along the line of road."

Under this amendment, what becomes of the "unjust discrimination against a locality" ? Why should Augusta shippers be given a lower rate than is allowed to a station 10 miles nearer Savannah ? Is this not a discrimination against a locality ? It evidently is, and can only be a "just and reasonable" discrimination because it is to the benefit of the railroad corporation.

And because it is to the benefit of the railroad corporation it is to the benefit of the public at large, and indirectly to the benefit of the shipper from a station where there is no competition and where there is a greater charge for a less distance, as I will proceed to show. Railroads are built to accommodate communities dependent for transportation upon water-courses, turnpikes, or public roads. They furnish cheaper and more convenient facilities than such communities before possessed, but still it costs something to maintain and operate them. If no charge was made for using them, this cost would have to

be met by taxation. But whether met by taxation or by charging freight and passenger rates, it is a tax at least upon the communities which have no other road to market. If it costs \$600,000 per annum to keep up a road, then the money must come out of the freight and passengers that are obliged to pass over it. Whether the amount of business be small or large, the money to keep up the road must be forthcoming, or it will go to decay. If 100,000 bales of cotton were the only freight that passed over a road which carried no passengers, that cotton would have to pay a freight of \$6 per bale if it cost \$600,000 per annum to maintain the road, and no legislation could make it otherwise. But if the quantity of cotton to be transported could be increased to 200,000 bales, then the cost of transportation could be fixed at \$3 per bale, to the great joy and relief of the shippers of the first 100,000 bales ; and yet the \$600,000 required to operate the road would be forthcoming. Now, suppose that the community which raised this second 100,000 bales had a water route to market and said to the railroad company, "it only costs a dollar per bale to ship our cotton by water, but we prefer to ship it by rail at the same price," who would be benefited if the company took the cotton at a dollar per bale ? Who but the local shippers themselves, for without this addition to the business of the road they would have to pay \$600,000 per year, or \$6 per bale, to keep up the road, while with the \$100,000 obtained from the other 100,000 bales of competitive or through cotton they would have to pay but \$500,000 or \$5 per bale on their own cotton. Should they turn around upon the managers of the railroad and say that it was unjust to the local shippers to charge only a dollar per bale on the through cotton ? No, it is not only just, but to the benefit of the local shippers, that the railroad which they are obliged to use should get all the business it can from those who are not obliged to use it, and at any rate the latter choose to pay, provided, and it is a very important provision, that such competitive

business adds something to the net revenue of the road ; or, in other words, if it be carried at anything above the actual cost of transportation. Once this fact is established, that a road is carrying competitive freight at any rate above the cost of transportation, it follows that such rate is not only just and reasonable to the shipper and to the corporation, but it is of benefit to the local shipper also, since it relieves his own burden to the extent of the net profit derived from the through business.

I have already defined the discriminations in local freight tariffs which may be considered as just and reasonable, and have shown that it is not an unjust discrimination against local shippers for competitive freights to be transported at less rates for the same or greater distance. It remains to state what are unjust discriminations.

(1) It is unjust to discriminate between persons ; that is, to charge one person less than another for the same service.

(2) It is unjust to discriminate between shippers of different quantities of the same article, except under conditions which enable the railroad company to perform the service more economically, as, for instance, between a carload and a quantity less than a carload, and perhaps when a full trainload is offered as a single shipment.

(3) It is an unjust discrimination to transport competitive freight at less than would be charged for local freight under the same conditions of quantity and distance, if the competitive rate will yield no profit above the cost of transportation.

Taking a practical view of the subject, it would seem that the charge of unjust discrimination is generally made with reference to competitive rates. Communities at non-competitive points complain that their rates to and from market are higher than for a longer haul at competitive points. This cannot be prevented unless competition is prohibited, or the offending company is for-

bidden to compete. As above stated, it is not unjust that the rate between competitive points should be less than for a shorter haul on non-competitive business, unless such rate is below the cost of transportation. How can competitive rates be maintained above the cost of transportation? The answer is, by combination among the competitors. Whenever public opinion and the respect paid by lawyers to precedents will permit contracts for this purpose to be legally enforced, instead of being stigmatized as unlawful, rates at competitive points will be maintained at figures sufficiently above the cost of the service to add to the net revenue of the competing companies and leave a margin for relief to local shippers. As matters now stand, the local shippers on the trunk lines are contributing to the maintenance of a wicked war of rates between western markets and the seaboard. Conservative railroad managers have sought to prevent this by framing agreements to maintain these rates, only to see their companies defrauded by unscrupulous rivals who entered into these agreements because they knew they could be violated with impunity. When legislators and judges require men who enter knowingly into such contracts to keep them as inviolate as they are required to keep their other agreements, competitive rates will be maintained upon a profitable basis and competitive business will contribute its proper quota to the net revenue of railroad companies. Nor need shippers who are interested in competitive business fear that if such contracts are legally enforced the rates will be injuriously high. The competition between different cities engaged in shipping the same products will be sufficient to prevent this. The railroad managers specially interested at Cincinnati, or Chicago, or St. Louis will see to it that what they consider their own legitimate trade is not diverted by a disparity of rates. They are quite as keen observers of the course of business as are their patrons, and will be as swift to mark its fluctuations. Combination for an exorbitant advance of rates at all competi-

tive points is impracticable. The two great interior water routes, the one by the Mississippi to New Orleans, and the other by the great lakes from Chicago, Milwaukee, &c., will always regulate this matter, in connection with the coastwise steamships on the Atlantic, the Gulf of Mexico and the Pacific.

The legalization of contracts intended to maintain competitive rates will also prevent the most unjust kind of discrimination that can exist—that between man and man.

There can be no form of discrimination more reprehensible than that by which one shipper from the same point is secretly favored at the expense of another in the same line of business. The favored one can be made rich by the same process that makes his competitor bankrupt ; and that is just what is done through that unrestricted competition which railroad managers condemn. The much abused pooling system is an attempt to obtain rates upon competitive business that are above the cost of transportation, and until some better device is offered to obtain the same end, those who are interested in legislation to prevent unjust discrimination should not permit themselves to be argued into opposition to pools. To those interested in maintaining unrestricted competition no argument in favor of pools need be addressed, for upon them it would have no effect. What they want are rates lower than any one else can get, even though they may be below the cost of the service rendered ; what they desire is not in accord with the interest either of the railroads or of the public in general, and yet the “pooling system” has its advantages for them also, for it does away with the pernicious “rebate system,” a system which takes the making of rates away from railroad managers and puts the power, not in the hands of the legislators, but of speculators—men who make their profits, not from buying and selling in open market, but out of rebates secretly paid by railroad managers, and virtually at the expense of those who pay the published rates.

This system went on from bad to worse, centering the business of competitive points in fewer hands, drawing the business of neighboring stations to competitive points, and rendering it impracticable for a man with a small capital to establish himself in business under such disadvantages. No wonder that the railroad managers themselves revolted against this condition of things. They no longer controlled their own business. Under the threat of losing freights they were forced to make concessions which they knew were wrong. They were annoyed by applications which it was impolitic to refuse, and met with suspicion and charges of treachery from the very men who were being made rich by rebates, yet feared that some one else might be getting better rates. When competition got too fierce one of the contending parties would call a truce, and peace would be re-established upon a basis of higher rates, which no one expected to use for any other purpose than as a standard by which to measure rebates. No wonder that railroad managers accused each other of fraud and deception. Men who in all the other relations of life were blameless winked at falsehoods and dallied with deception, not because they were morally debased, but actually because they knew not the way out of the toils. Specious methods of maintaining agreements, and yet breaking them, were devised to meet the occasion. Secret service funds were placed at the disposal of trusted agents, not to be accounted for ; through passage tickets were sold to favored shippers, never to be paid for ; and one tissue of fraud and deception was woven after another until the web became so fine as to be worthy of the father of lies himself. It is this rebate system, with its corrupting influences, that Congress is expected to call back to life by threatening pains and penalties upon the railroad corporations that have replaced it by the pooling system—a system which, so far from being placed under the ban of the law, should be legalized. The public calls for legislation against rebates as loudly as for legislation

against extortion and unjust discrimination; but until human nature can be changed by law rebates will be paid in one way or another where unrestricted competition exists. Congress should seek to prevent unrestricted competition as well as unjust discrimination, and the railroad companies have themselves pointed out the way. If the pooling system be legalized—that is, if a party to a contract to maintain rates can be sued for damages for violating such an agreement—then the shippers at competitive points, paying only just and reasonable rates, freed from all fear of discriminating rebates, will find that their business will not suffer from the greed of corporations, but will prosper under rates alike for all.

#### JUST AND REASONABLE RATES.

The Committee's second question is as to the reasonableness of the rates now charged upon local and through traffic by corporations engaged in interstate commerce.

The answer to this question depends upon the meaning of the word "reasonableness." Webster defines it as "that state or quality of a thing which reason supports or justifies." It may, therefore, be asked whether reason supports or justifies the rates charged on local and through traffic. As to through or competitive traffic, it may be said that reason will not support or justify competitive rates which are not equal to the cost of the service rendered, nor secret rebates to a large shipper, while small shippers are made to pay the published rates. Whether it be reasonable to charge local shippers higher rates than are charged upon competitive business transported longer distances depends upon the considerations contained in my reply to the first question. The reasonableness of local rates depends upon considerations of a different character. As stated in the reply to question No. 1, the local traffic must yield sufficient revenue to maintain a railroad, except so far as revenue for this purpose may be contributed



by competitive traffic. But while the local traffic in mass must support a road, a certain reasonable relation should of course be preserved in making rates upon the various articles offered for shipment. That this ideal state of reasonableness has been obtained is not to be asserted. Indeed, the process of reasoning by which rates for carriage were originally established and subsequently developed cannot be accurately traced. Many essential facts have been allowed to lapse unnoticed into oblivion. The common carrier by land was originally a carter, and when his occupation was shared by railroad corporations, their rates were naturally based upon the carters' rates. And as railroads came to compete with carriers by water their rates were still further modified.

It must be borne in mind that what is called local or non-competitive business, though not subject to competition by other railroads, is still open to competition by wagons or by water carriage. Special competition may exist, as in the transportation of coal by canals, which would not affect the transportation by rail of other commodities; but as a general thing the reasonableness of local rates in the early days of railroads seems to have been obtained by a classification of articles, as wet and dry barrels, boxes, and bales, or shipments in bulk. The advance from such a state of things to the modern freight classification, substantially uniform throughout the United States, is unquestionably an effort to adjust the rates upon articles varying in value, bulk, fragility, &c., and in such a way as to distribute the contribution of each shipment to the sum total of local revenue equitably among them all. And this is "a quality which reason supports or justifies," for the charge upon a shipment is made up of two elements—the class in which the article is placed, and the rate upon that class. It is much easier to fix the relations of articles by classes than the relations of the rates which should be charged upon the several classes. It is the latter consideration which enters chiefly into the establishment of

the amount which each class of goods must contribute to the maintenance of the railroad. There are no accurately defined rules for determining this matter. Railroad logic and mathematics have not reached this summit of perfection. We have inherited the rates which our predecessors have fixed under conditions above noted. We have modified them here and there as circumstances seem to require, and such will continue to be the process. Our methods will improve as our knowledge increases. The method of classification now in use may undoubtedly be considered a reasonable one. As to the fixing of local rates, there is but little method about it. Railroad managers are much divided as to what would be a rational basis. Of course such a basis should recognize what is termed "the cost of transportation." But what is meant by "the cost of transportation"? Ask half a dozen railroad managers, and you will probably receive as many different replies.

I will repeat that the local traffic must pay for maintaining the railroad, assisted as far as may be by competitive traffic. But what constitutes "maintaining a railroad"? It includes the cost of maintaining the property and paying the men. Somewhere among those expenditures lie concealed the items which go to make up that desideratum, "the cost of transportation." One eminent authority arbitrarily divides the total expenditure ratably between passenger mileage and freight mileage, and says that the "cost of transportation" is so much per passenger mile and so much per freight mile. If this assertion could pass undisputed our task would indeed be an easy one. We could fix a reasonable rate of profit upon the stockholder's investment, divide that out per passenger and freight mile, and any schoolboy could solve the problem of "just and reasonable rates." But the problem cannot be solved in that way. All the difficulties which have led to fixing different rates for different distances and for different articles forbid such a solution. Another eminent

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authority suggests that about one half of the cost of maintaining and operating a railroad is virtually unaffected by the amount of business done ; another part is chargeable solely to passenger or freight traffic ; certain expenses are greater or less, varying with the train or car mileage, or with the amount of freight loaded or unloaded. This is in the right way to a correct analysis of the items which enter into "the cost of transportation," and some very ingenious and greatly involved algebraical formulæ have been constructed to aid in arriving at a solution. I think that the mathematicians who framed them have never had sufficient confidence in their own work to apply it practically to their own business. The men who are experienced in such matters, who are alike removed from fine-spun theories and from blind adherence to antiquated methods, who, in short, represent what may be called the common sense of railroad management, will probably agree that the reasonableness of local freight rates should be based :

(1) Upon their providing a net revenue sufficient to maintain the property in good condition and leave a fair profit to stockholders. The passenger traffic must, of course, contribute its share of revenue, and competitive business should not be conducted at the expense of local shippers.

(2) As between the different classes of local business, due regard must be paid to keeping certain rates at or below the point where a suitable margin of profit is left for the shipper.

For instance, on each road there are certain staple articles, products of the field, the forest, the mine, &c., or manufactured goods, that form the basis upon which the prosperity or the very life of the people is based. The rates upon such articles must not be more than they can bear. It would be killing the goose that lays the golden egg. It is from the margin of profit remaining to the producer that he is to pay freight on the supplies which

he purchases, and for his own fare when he travels. As specially applied to such articles, "the cost of transportation," that is, the rate below which the railroad company cannot transport them without positive and immediate loss, can be approximately ascertained. It is for the railroad management to observe this closely, and whenever circumstances render it practicable the rates on such staples should be varied within certain limits with the margin of profit to the consumer. The minimum limit should be the specific cost of transportation, that is, what the corporation would save by not transporting that particular article ; the maximum should be the full local rates ordinarily charged upon it. Theoretically, the reasonable rates to be charged upon the staple products of a country would be a fixed percentage of the margin of profit returned by the merchant to the producer ; the charges of the merchant not to include the local freight charges, and the railroad company to be entitled, in any event, to the specific cost of transportation. Practically, it is somewhat in this way that rates are now determined where they are not established by law, for the carrier knows that if such rates are higher than the business will bear the business will languish or die out. There are also certain articles which, under certain conditions, it might be reasonable to transport at the cost of transportation in order to stimulate production.

The Massachusetts Railroad Commission advised the railroads of that State to transport coal for manufactures at the bare cost of transportation. They feared that the cost of fuel for steam-power would divert manufactures to other States where coal was cheaper. Was it reasonable to expect this of the railroad companies ? Did reason support or justify this discrimination between coal for manufactures and coal for domestic purposes ? The answers to these questions cannot be definitely given in our present state of knowledge as to the items which enter into the cost of transportation.

The differences of opinion between shipper and carrier grew out of the want of information on this very subject. The attention of experts has for some time past been attracted to it, and, as the facts accumulate, we seem to be nearing the solution of the problem. For the present the reasonableness of local freight rates can neither be asserted nor denied except under unusual circumstances; certainly not with sufficient confidence for the conditions which should determine it to be defined by act of Congress.

### PUBLICITY OF RATES.

Should publicity of rates be required by law? Should changes of rates without public notice be prohibited? What is the best method of securing uniformity and stability of rates. These are the three queries embodied in the third question of the committee.

Publicity of rates would be a reasonable requirement. It is customary with railroad companies not only to furnish such information freely, upon application, but also to print and distribute gratuitously their local tariff sheets and what are known as "open" competitive rates. But they do not give equal publicity concerning rebates to favored customers. A penalty for secret rebating—a legal enforcement of contracts to maintain competitive rates—would probably insure all the publicity that could be desired.

The changing of rates without previous notice is injurious to shippers in general. Those who had been secretly advised of an intended change of rates upon any important article would have an unjust advantage over their less favored rivals. In the interest of shippers and of stockholders, uniformity and stability of rates are greatly to be desired. The methods of securing them have been considered in my answers to the first and second questions.

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## MAXIMUM AND MINIMUM RATES.

The fourth question is as to the advisability of establishing a system of maximum and minimum rates. Maximum rates were incorporated into some of our earliest railroad charters. Competition has reduced all railroad rates far below the maximum then established. At no time do they seem to have served any useful purpose. If maximum rates were re-established, with our present experience, they would be just as unserviceable. If a maximum rate of 1 cent per ton per mile were fixed for the interstate commerce of the trunk lines, competition with water routes would prevent them from demanding it ; yet if such a rate were fixed for the commerce between the Southern States it would perhaps bankrupt the corporations affected by it.

Minimum rates might be of some effect in preventing a reduction below the cost of transportation, if punishment could surely and swiftly follow an infraction of the law ; but the difficulty of conviction would bring the law into contempt, and those who conscientiously observed it would be the principal sufferers. We must remember, too, that the ingenuity and experience of man has been constantly reducing the cost of transportation, and what would have been considered a very low rate some years ago would leave a very fair profit under the improved methods now in use. Although the rates have been reduced much faster than the expense of operating railroads, and the margin between them is now proportionately smaller than ever before, still no one can truly assert that the utmost economy practicable in railroad management has been attained. The legal enforcement of contracts to maintain rates will be of far more protection to investors and shippers than the establishment of maximum and minimum rates.

## ESTABLISHMENT OF INTERSTATE TARIFFS.

The elements of cost, the conditions of business, and the other factors that should be considered in fixing interstate tariffs, have been incidentally referred to in the replies to the previous questions.

The conditions which distinguish competitive or through traffic from that which is local or not competitive have also been noted. The local traffic, freight and passenger, of any railroad must furnish the means to maintain and operate it. If there be any other traffic which may be diverted by competition, then such competitive traffic will also contribute to the support of the road to the extent that the receipts from such service exceed the cost of performing it. The expenses ordinarily incurred in operating and maintaining a road bear varying relations to the work performed in transporting freight and passengers. They may accordingly be divided into certain classes, as—

Class A.—Expenses not affected by the amount of business done.

Class B.—Expenses affected indirectly by the amount of business done ; for instance, by a considerable increase or decrease of traffic.

Class C.—Expenses directly affected by the amount of train service.

Class D.—Expenses directly affected by the amount of car service.

Class E.—Expenses incurred in loading and unloading freight.

Class A, or fixed expenditures.—In this class may be included salaries and office expenses of general officers ; legal expenses ; rents, taxes, insurance ; maintenance of earthworks and fences ; repairs to bridges and buildings ; repairs of machinery, tools, and implements ; furniture

and fixtures ; pay of bridge watchmen ; and telegraph expenses. This class of expenses virtually remains the same whether the business done be much or little.

Class B.—Expenditures remotely affected by amount of business done : Stationery, printing and advertising, repairs of wood and water stations, renewal of cross-ties, supplying water for locomotives, labor on track ; wages of agents, clerks, watchmen, and switchmen at stations ; loss and damage claims.

This class is remotely affected by the amount of business done, i.e., if the business be largely increased or diminished.

Class C.—Expenditures affected by train mileage : Renewal of rails and fastenings, frogs, and switches ; repairs of locomotives ; supplies for locomotives ; pay of conductors, engineers, baggagemen, firemen, and brakemen ; stock killed by trains ; accidents to trains.

Class D.—Expenditures affected by car mileage : Maintenance of cars ; oil, tallow, and waste for lubricating car-axles ; hire of cars.

Class E.—Expenditures affected by tonnage : Labor loading and unloading freight.

The classification here given is in sufficient detail to show that the expenses of operating a railroad do not vary directly with the amount of traffic ; that one class of expenses bear no relation to it ; that other classes depend upon the amount of service performed by the engine or cars, whether they are earning much or little, and that but a small class bears a direct relation to the tonnage. It should also be noted that much of this expense has to be incurred in preparation for business that may prove less than expected, and that expenses cannot be diminished in the same proportion that business decreases.

It must next be stated that the business of a railroad is twofold in its character : it transports passengers as well as freight, and to ascertain the cost of performing each service, the operating expenses should be apportioned



to the services for which they are incurred. This cannot be done accurately with all classes of expense, and the apportionment must to some extent be based upon the relative volume of the two kinds of business.

The expenses specially incurred for passenger business are : The salaries and office expenses of officials employed solely in this service ; also of conductors, engineers, and others employed only on passenger trains ; the maintenance of passenger stations and of passenger train locomotives and cars ; fuel for locomotives ; advertising and other printing, and stationery required solely for this purpose.

The expenses specially incurred for freight business are : The salaries and office expenses of officials so employed ; pay of men employed on freight trains and at freight stations ; maintenance of freight stations ; maintenance of locomotives and cars in freight service ; fuel for freight-train locomotives ; advertising and other printing, and stationery required solely for this service. All other expenses, not specially incurred in one service or the other, should be divided between them upon some recognized basis, and that of the respective car mileage in each service will answer the purpose.

According to this calculation the operating expenses of the Savannah, Florida & Western Railway for the year 1884 have been classified as follows :

|   | Per Cent.  |
|---|------------|
| For fixed expenditures, Class A.....                                      | 17         |
| For expenses indirectly affected by amount of business done, Class B..... | 32         |
| For expenses affected by train mileage, Class C.....                      | 22         |
| For expenses affected by car mileage, Class D.....                        | 21         |
| For expenses directly affected by amount of freight handled, Class E..... | 4          |
| For renewals of rails.....  | 4          |
| <b>Total.....</b>   | <b>100</b> |

Therefore, any increase or decrease in the number of tons of freight transported affects only 4 per cent. of the total cost of operations, unless a greater or less number of cars be required to run a greater or less distance.

Any increase or decrease in car mileage affects 21 per cent. of the total operating expenses.

If the increase of business requires more trains to be run, then 22 per cent. of the expense may be proportionately increased. But there remains 53 per cent. of the total cost of operating the road, that practically cannot be decreased with a diminishing business without impairing the efficiency of the service, and that need not be increased when additional business is offered.

It is usual to state the average cost for hauling one ton of freight one mile, but it does not follow that the transportation of each ton has cost that amount. Here it is that the facts are obtained in fixing the specific cost of transportation of competitive traffic. If freight is offered at a competing point that can be carried in a car which would otherwise run empty, the only cost incurred is for loading and unloading the freight; all obtained over that cost would be profit. If the car has to be sent for the freight, then an additional cost will be incurred for the distance that the car runs to perform the service. If the freight offered amounts to enough to load the train, then there is the cost for the train service beyond the cost which attaches to running each car in the train.

As a practical illustration of the use that can be made of this information in fixing minimum rates on competitive business, let us suppose cotton to be offered to the Savannah, Florida & Western Railway for transportation from Bainbridge to Savannah, a distance of 237 miles.

If there be an empty car at Bainbridge to be returned to Savannah, the cost will be for loading and unloading 30 bales of compressed cotton, say  $7\frac{1}{2}$  tons at 12.6 cents per ton. . . . . \$0.94 $\frac{1}{2}$

|   |  |                |
|---|--|----------------|
| If a car had to be sent for the freight, add the distance both ways, 474 miles, at 1.73 cents per mile..... |  | 8.20           |
| Total cost per car load.....  |  | <u>\$9.14½</u> |
| But if a train of say 25 cars be required, then the cost for 25 cars, at \$9.14½ per car, would be..        |  | \$228.62½      |
| And for train mileage (474 miles), at 24.6 cents per mile.....  |  | <u>116.60½</u> |
| Total cost per train of 25 cars.....  |  | \$345.23       |
| Total cost per car.....   |  | \$13.80        |
| Total cost per ton.....   |  | 1.84           |
| Or, for a bale of cotton, say.....  |  | .46            |

The example here given illustrates the fact that business obtained by competition, even at low rates, assists to lighten the burden of those who must pay local rates; also, how it may be profitable for a railroad company to offer reduced rates for shipments with which cars may be returned loaded to destination, which would otherwise go back empty. I have been careful to state that this illustration applies only to the specific cost of transportation of competitive freight; that is, the point below which such freight cannot be taken except at the expense of local shippers.

With local business the conditions are different. The local freight and passenger business must between them maintain a road which has no other resources. Each class of business should bear its own expenses and its proportionate share of expenses which cannot be specifically divided. If the revenue of a road be obtained 70 per cent. from freight and 30 per cent. from passenger business, then these joint expenses might be charged proportionately to each class of business. In this way it might be

determined whether the net revenue of a road was obtained disproportionately from either source of revenue, and the rates be readjusted accordingly, forbearing to unduly advance rates on staple products.

I have endeavored to indicate in a general way the elements of cost and the conditions of business that should be considered in fixing interstate tariffs, according as the traffic is or is not competitive. I assume that Congress would not attempt to evolve a general interstate tariff out of its own consciousness.

My whole argument has tended to show:

(1) That uniformity of classification is desirable; how it has been attained and may be modified as required without legislation.

(2) That uniformity of rates is not desirable.

(3) That just and reasonable rates on competitive business can best be determined by contract between shipper and carrier, not to be fixed below the specific cost of transportation.

(4) That the legal enforcement of contracts between railroad companies to maintain rates is the best method to regulate such rates in the interest of all shippers, competitive and local, of all stockholders and creditors of railroad corporations, and of the public.

(5) That the rights of local shippers do not call for any further intervention of law as to rates on competitive business than is stated in the above proposition.

(6) That the local business of a railroad must maintain it with such assistance as may be obtained from the profits derived from competitive traffic, and that the rates on local business must be fixed with this calculation in view.

(7) That rates on local staple products should be so fixed as not to depress such industries, and should fluctuate within certain limits with the variation of profits derived from them.

(8) That certain classes of discrimination on local rates are just and reasonable.

(9) That intentional discriminations between individuals should be made criminal offenses.

I wish that it were practicable to give specific rules for making a local freight tariff out and out; but this cannot be done. We can only take the several tariffs as they exist, and modify them here and there as the intelligent application of facts may justify. This is a work which cannot be done either by act of Congress or by a commission; the field is too large and the variety of conditions is too great. The modification of local tariffs had best be left to the shipper and the carrier, to the influence of the press and to public opinion, enlightened continually, as it will be, by the elevation of these railroad questions to prominence among the issues of the day and the discussions that will thereby be occasioned. From local business the principal net revenue of most roads must come, and the main issue between local shippers and the railroad managements will be the equitable adjustment of rates among the local shippers themselves.

The principal points to be observed in a tariff for competitive business are to insure a uniform rate to all shippers similarly situated, which shall be above the specific cost of transportation. Under this head of specific cost should be included the maintenance of all structures and appliances rendered necessary by this very competition, such as grain elevators, terminal docks and yards, the third and fourth track of a trunk line, and perhaps one track of a double-track road.

I have not included the expenditures for betterments among the items entering into the cost of transportation. They should properly be a charge to capital account, and be represented by bonds or stock. Additions to property which do not result in reduced expenses or increased business are poor investments, and the money so spent had better been divided among the stockholders if taken from net revenue, or if obtained as a loan, then the increase in

the fixed charges must diminish dividends or prove an additional burden to local traffic.

#### REBATES AND DRAWBACKS.

“Should any system of rebates and drawbacks be allowed? If so, should such transactions be regulated by law and be subject to official inspection or approval, or should they be entirely prohibited?”

The replies to former questions present my views upon secret rebates, but cases may occur where rebates could properly be allowed under suitable provisions for publicity and for uniform application. The suggestion that coal for manufacturing purposes should be transported at or about the cost of performing the service, as made by the Massachusetts Railroad Commission, is a case in point. If this suggestion were to be put in practice it would be difficult to determine at the time the coal was transported which shipment was for manufacturing purposes and which was not; but provisions could be made for a rebate upon the amount that a manufacturer could show had really been consumed by him in that way. The system of custom-house rebates is apparently based upon similar considerations. It is questionable whether Congress should interfere in regulating such reasonable rebates or in subjecting such transactions to official inspection and approval. Suitable publicity would, in the case above noted, put every manufacturer on notice as to the extent of the rebate and the conditions under which it would be given, and if any one consumer of coal was unduly favored, it would virtually be a fraud upon his rival, of which the courts could take cognizance through a civil suit for damages against the offending railroad company.

## POOLING AGREEMENTS.

The seventh question, as to the advisability of legal recognition and regulation of pooling contracts and agreements, has been substantially answered in my replies to the questions preceding it. I have no doubt as to the propriety of giving legal sanction to these agreements to such an extent as will enable one of the parties to sue the other party for damages growing out of its alleged violation. In such a suit the terms of the agreement, the circumstances under which it was made, and the purpose it was intended to serve would all be exhibited in the evidence and the arguments, and I venture to say that two or three such suits carried to a conclusion would serve as powerful correctives of the evils resulting from unrestricted competition, of which the people justly complain. The evidence of experts which would be given in such suits, the arguments of counsel, and the opinion of the court, analyzed and commented upon by the press, as they would be, would aid largely in bringing the public to an intelligent comprehension of the issues between the shipper and carrier—issues which have been obscured by parties interested, partly from design and partly from ignorance. Beyond such legal sanction it would, in my opinion, be inadvisable to go in the direction of legislative regulation and approval of agreements to maintain rates. At all events it would do no harm to stop just there until some experience had been obtained as to the effects of the experiment.

## ROUTING FREIGHT SHIPMENTS.

The right of shippers to select the lines and parts of lines over which their shipments should be transported is indefeasible, and should not be restricted by legislation. The argument made by the trunk lines favoring its restriction

is invalid. It is a confession of their lack of confidence in their own good faith toward each other in the maintenance of agreements to maintain rates, and furnishes additional evidence of the value of a legal recognition of such agreements. If the trunk lines then choose to embody in their contracts among themselves a condition that shipments should be diverted at their pleasure, the courts could determine the rights of an objecting shipper. Until a competent court decides to the contrary it would seem that these rights already subsist in the shipper without further legislation. If the shipper be willing to forego them for a valuable consideration, e.g., a reduced rate, that is a matter for a contract between him and the carrier.

#### UNIFORM RATES AND CLASSIFICATION.

A uniform system of rates for interstate transportation of freight and passengers is not to be desired, and the need for such uniformity is not obvious. Uniformity is an obstacle in the pathway of progress, and in a country of varied topographical features and industrial resources the attempt to regulate every man's business with the same unit of measurement would be a bar to its accelerated prosperity. It would be as well to require both corn and oil to be measured by the gallon. The principles upon which a system of rates should be based is another matter. Such principles should be as capable of application to the interstate commerce of the Pacific slope as of New England, and yet the manner of application might be different. As I have previously stated, there are two elements in a freight tariff—the classification, and the charge for each class. The classification might well be uniform in the main, though specially varied to suit local conditions, as for coal and ore in a mining country, or for lumber in a forest region. But this uniform classification should not be petrified by law, for then it would soon become a fossil indeed.



The experience of the Southern Railroad and Steamship Association shows that its uniform classification has frequently to be revised, and in the public interest. The Rate Committee of that Association holds frequent meetings, at which the applications of shippers for the modification of the existing classification are considered and acted upon. The modifications determined upon are specially published and duly incorporated into the official tariff. A revised addition of this tariff is then issued by the General Commissioner and distributed among the members of the Association. How could legislation better secure a uniform system of rates for interstate commerce? Great attention is paid to the classification of different articles. For instance, the different kinds and parts of plows are classed in nine ways, ale in seven, and furniture in thirty-six. This minuteness of detail grows out of the efforts of the Association to conform to the requirements of trade, and yet this Association, so far from having legal sanction, is seriously threatened with penalties as an unlawful combination conspiring against the public welfare.

While I am clearly of the opinion that a virtually uniform classification is practicable, and have pointed out the way to secure it, I am as clearly of the opinion that uniform rates are not only undesirable, but also impracticable, for the reason that the rates essential to the existence of a railroad in one part of the United States would be oppressive to shippers elsewhere. The extent to which uniformity in the charges upon each class is practicable, and to which discrimination is just and reasonable, I have already discussed at length.

## LONG AND SHORT HAUL.

Should a proportionately lower rate be permitted for a long haul than for a short haul? Only in competitive traffic, for the reasons and under the considerations I have already given.

The public interest requires no legislation beyond the experiment of legalizing contracts to maintain rates upon competitive traffic.

## CONCESSIONS TO LARGE SHIPPERS.

Concessions in rates to large shippers commend themselves to minds accustomed to advantages claimed by wholesale dealers in their commercial transactions, but the conditions surrounding transportation contracts differ in some respects from those of bargain and sale. The rights of third parties are different in the two cases. As between buyer and seller, the larger the transaction the less is the proportionate expense attendant upon effecting the sale, and the more eager is the seller even at a small margin of profit. He would rather make 5 per cent. on one transaction of \$10,000 than 6 per cent. upon each of ten transactions involving \$1,000, or 7 per cent. upon one hundred transactions involving \$100 apiece; and this, too, even though the attendant expenses in each case were the same. This is no infringement upon the rights of others, even though the larger buyer has consequent advantage over the retail dealer. But railroad transportation is another matter. The expression "selling transportation" is sometimes used, as if it were the same as to sell coal or corn; but this is a mistake. Railroad corporations do not sell transportation. They have been granted a franchise to collect tolls. A privilege has become vested in them; they do not possess a natural right. A railroad

company occupies a position toward the public different from that of a turnpike company. It owns both the route and the vehicle, and carriage over the route is not an occupation free to all. It is monopolized by the owner of the route. If he have the power to fix the price, the person desiring the service performed over that route must pay it or not obtain the service. This is true if the service must necessarily be performed over that route, but if there be another route between the same points then the person desiring the carriage may exercise his option.

Here, as elsewhere, we are met by the distinction between that traffic which is competitive and that which is not. If there be alternate routes, then the relation between shipper and carrier as to rates of carriage is largely a matter of contract; but when there is not an alternate route, this relation is, if I may use the expression, more a matter of status; and the shipper is therefore more entitled to invoke the aid of the law in defining that relation. But he stands in the relation of a third party to contracts between carriers and shippers of competitive freight, and the State ought not to interfere in such contracts for his benefit, except so far as his rights may therein be affected. It is not right to add anything to the charges upon his shipments to offset losses upon transporting competitive freight, and his rights are affected by any competitive rates which are below the specific cost of transporting the articles offered for shipment to rival roads. As between shipments of competitive freights offered in different quantities, there seems to be no necessity for legal enactments beyond requiring suitable publicity of the conditions under which such shipments are made. A civil suit for damages would probably protect any shipper suffering by a secret departure from those conditions in favor of a rival. All else might well be left to agreement between the shipper and carrier. It may be asserted that this would be discriminating greatly to the advantage of the dealer or manufacturer at competitive points, and against

the dealer or manufacturer at points where there is no competition, and such an assertion might be correct. But how does this discrimination arise? It arises from difference in geographical position as affecting facility of transportation. Cities with safe harbors, convenient of access by sea and at the mouths of navigable rivers, or adjacent to practicable mountain passes, became centers of trade in prehistoric times, and the same conditions for the facility of transportation continue to concentrate commerce at such places. With the invention of the locomotive and the iron rail they began to supplant the turnpike and the wagon; they were first used where they were most wanted, where the greatest traffic already existed—as, for instance, between Liverpool and Manchester, and between New York and Philadelphia. The gradual extension of the railway systems resulted in railroads meeting or crossing each other, and competitive traffic was established at such junction points which occasionally, as at Atlanta, became large cities. Railroad corporations have not originated the discrimination in favor of competitive traffic and against local traffic. It existed before they did, and the economic law of supply and demand compelled them to recognize it.

But as between local shippers the case is different. The railroad company ought not to discriminate between them except when such discrimination can be shown to be just and reasonable. As I have already shown, it is just and reasonable to discriminate between shipments in different quantities of the same article where, by reason of the increased quantity, the specific cost of the transportation is proportionately lessened. It is generally accepted that this is true of carload shipments; it is probably as true of trainload shipments, and especially when business for a train is insured for a considerable period of time. There are more likely other causes in which such discrimination might justly be made. It may be laid down as a general rule that, as between local shippers, no distinction

in rates for quantity should be made unless the specific cost of transportation be proportionately lessened.

### UNIFORM SYSTEM OF ACCOUNTS.

A uniform system of accounts for railroad corporations would be, to my mind, as undesirable as a uniform system of rates, and for the same reasons : first, that a perfect system of railroad accounts has not yet been devised; and next, that " circumstances alter cases," and the elaborate system which is required for setting the multifarious affairs of the Pennsylvania Railroad Company properly before its stockholders, if applied to the affairs of a minor corporation, would be like a giant's armor upon a dwarf. The accounts of a railroad company are intended primarily for the protection and information of its stockholders, and should be as free from the interference of any one else as the accounts of any other corporation or of a private individual. If the rights of a third party are affected by the manner in which they are kept, there are ample precedents for having them produced in court and suitably explained. It is difficult to understand how the interest of persons engaged in interstate commerce could be affected by the manner in which the accounts of corporations are kept which are engaged in such commerce, and it does not seem necessary for their protection that Congress should require such corporations to adopt a uniform system of accounts.

### ANNUAL REPORTS.

Corporations engaged in interstate commerce might be well required to make annual reports to the Government. It is the right of the public, stockholders, creditors, and shippers to be informed as to their operations, and the publication of such information would serve to correct erroneous impressions concerning them.

These reports should only contain such information as the public might rightfully demand as stockholders, creditors, and shippers. Nothing should be conceded to idle curiosity or to thirst for scientific statistics. The one deserves rebuke, and the other does not warrant an unwelcome intrusion into the affairs of a railroad corporation any more than into the affairs of a private citizen. But such information as the public may rightfully require of a railroad corporation, that information an annual report to the Government should contain, within certain limits. The limit as to information for stockholders would seem to be fixed by the right of minority stockholders to obtain such information. A majority interest could obtain any information at an annual meeting, but not so with the minority. The latter would seem to be entitled to know the financial condition of the company without resorting to a court of equity, and therefore such information as to the amount respectively of the various issues of bonds and stocks, and of the floating debt, the income account, and the assets and liabilities, could properly be called for in a prescribed form so simple as to admit of no misconstruction. The creditors of the company would find in such a statement all the information which they could rightfully require. The rights of shippers pertain rather to statistical information, especially as to tonnage, properly classified and divided as competitive or otherwise, to similar information as to passenger business, and to such classified statements of expenditures as would throw a light upon the cost of transportation. None of the forms required by the State commissions give this information in proper form for such use, so far as I am aware. Some of them go into a good deal of irrelevant detail, and some stop short of the right point.

## WATER ROUTES.

The development and maintenance of a system of water routes by the Government as a security for cheap transportation is a subject of grave importance. The United States has been for many years committed to the policy of maintaining and improving natural waterways. It has been looked upon as a matter of general public interest in which private capital could not be profitably invested, since no tolls could be collected from the traffic over such routes. But in the question as stated in the committee's circular, the development of a system of water routes to secure cheap transportation seems to look to the construction of canals intended specially for competition with the railroad systems of the country—systems controlled by private enterprise which have reduced the charges upon interstate commerce to such an extent that the Erie Canal could not hold its own in the contest. That great water route, constructed at the expense of the tax-payers of New York, is now also maintained at their expense. Would it be right for Congress to follow this example, to throw the financial strength of the United States into the scales against the capital of individuals, of estates of widows and orphans invested in railroad property? The contest for competitive traffic between the subsidized canal and the unprotected railroad to which it is parallel will be fierce for a while, but the issue will not be doubtful. Shipments by the canal will not have to pay any part of the interest on the original investment in its construction, nor for maintaining it. They will only have to contribute to operating and maintaining the canal-boats. Whatever the rate may be by canal that will be the rate by the competing railroad, unless shippers be willing to pay a little higher rate for greater dispatch. Whatever that rate may be it is not supposable that there will be any considerable margin above the specific cost of transportation—that is,

that it will contribute anything towards the general maintenance of the railroad or towards the interest upon the investment. It is much more probable that the rate by the highly favored canal will be reduced below the actual cost incurred by the railroad for transporting such competitive freight, and that the resulting loss will be made good from the net revenue from local business ; and residents along the road interested in local business will not only pay higher local rates in order to maintain this competition, but will make a further contribution for the benefit of their fellow-citizens to the extent that they are indirectly taxed to build and maintain these canals. The alternative is for the railroad companies to withdraw from the competition and leave the carriers by canal to fix their own rates for such service. It is possible that competition might be carried to such an extent as to bankrupt the railroad corporations, and we should then have the spectacle presented to us of the wealth and power of the people of the United States being employed to bankrupt one class of citizens for the benefit of another, which would be class legislation indeed. When we consider the great reduction in the rates upon competitive traffic which has been brought about by the railroad corporations of this country, it would seem that such treatment of them would accord with the proverbial ingratitude of republics.

I have already shown that it is not necessary for Congress to come down into the arena of competitive traffic as a combatant for the purpose of protecting such traffic against unwarrantable railroad combinations. The geographical features of our great country render this unnecessary.

On the one hand, there is the great chain of lakes which feed the St. Lawrence River, and which are connected by the Erie Canal with the commercial metropolis of the United States ; on the other, the Father of Waters, reaching out his arms—the Red River, the Arkansas, the Missouri, the Upper Mississippi, the Ohio, the Tennessee, the Cumber-



land River. These two great natural water routes not only led the way to our commercial prosperity while railroads were yet unborn, but they still exist to protect it against the combined attacks of greedy railroad stockholders. There are other natural waterways, which in a lesser degree serve for such protection for interstate commerce. The Connecticut, the Hudson, the Delaware, the Potomac, the Savannah, the Apalachicola, the Alabama, on the Atlantic slope, and the Columbia on the Pacific slope, are instances in point ; and "pour'd round all, old ocean's gray and melancholy waste" unites them in one grand combination, against which the puny opposition of railroad pools shall not prevail.

#### INTERSTATE COMMERCE LEGISLATION.

The thread of argument which has run through my replies to the previous questions indicates my views as to the extent to which interstate commerce should be regulated by legislation. The fifteenth and last question asks how such legislation could best be enforced. I have asserted that the great evil is the reduction of the charge upon competitive traffic below the cost of performing the service ; that this is an evil not only to the competitive shippers, by reason of secret rebates, but also to the local shippers, who have to make good whatever is lost to the railroad companies through unrestricted competition ; that it should be lawful for railroad companies to restrict competition by agreement, and that such contracts should be enforced as other lawful contracts are enforced. Where interstate commerce is not competitive, unjust discrimination should be defined in a simple way, and such legislation as may be necessary for this purpose should include provisions for its enforcement in the courts.

Legislation within the limits here suggested would not require the establishment of a commission or other special

tribunal to execute it. This would seem to be a merit rather than a fault in law-making of a confessedly experimental or tentative character. If, after sufficient trial, it should not accomplish all that was expected of it, there would be no false step to retrace, no irretrievable damage to investments through blundering, but the experience thus acquired at small expense would serve to indicate the right direction and extent for additional legislation.

## RAILROAD ACCIDENTS ; THEIR CAUSES AND THE PRACTICABLE SAFEGUARDS AGAINST THEM.

(Delivered before the World's Railway Commerce Congress, held  
in Chicago, Ill., June 19-23, 1893.)

I have been requested to prepare for the Railway Commerce Congress a paper upon "Railway Accidents ; their Causes, and Practicable Safeguards against them."

In seeking the causes of railway-train accidents, they may be variously classified as between those for which the railway corporations may properly be held responsible as due to defects in track, in equipment or in regulations, and those for which they should not be held responsible because beyond their control ; as when proximately caused by obstructions, by malice, by negligence, or by disobedience of orders.

The personal injuries resulting from train accidents may be classified as affecting passengers, or employees, or trespassers, or persons rightfully on the railway tracks or grounds, and there is a class of personal injuries by trains which cannot be included in railway-train accidents, as occurring at road crossings, or where employees fall from trains, or are injured in coupling.

In the discussion of practicable safeguards against train accidents something should be determined as to their relative frequency as attributable to the several causes to which they are due.

The official report of the Interstate Commerce Commission and of the Massachusetts Railroad Commission refer only to those accidents from which personal injuries resulted. The Railroad Gazette has for many years pub-

lished monthly and annual statistics of train accidents in this country, grouped as to their character and cause.

In an editorial article on train accidents in 1892, published in February last, there is a tabulated statement of this kind covering the past twenty years. These statistics are necessarily based upon insufficient data, mainly from newspaper items ; but though confessedly incomplete, this is all that is available for the purpose. In this statement the accidents are compared in periods of five years, beginning with 1873 and extending to 1892, giving the averages per annum in each period ; those in the year 1892 being also classified separately. The classification is under the three general heads of collisions, derailments, and accidents neither collisions nor derailments. Then these general heads have been subdivided with reference to the specific causes so far as ascertained.

From these statistics I have prepared two tables, as follows :

Table A, showing the percentage of each class of accidents to the total number per annum as averaged in each period.

Table B, showing, first, the average number of each class of accidents in proportion to the number of millions of revenue train miles ; second, the average number of millions of revenue train miles to each class of accidents.

The information as to revenue train miles has only been obtained for the periods 1883 to 1887, 1888 to 1892, and for the year 1892.

An examination of Table A presents certain results as follows :

1st. The total number of accidents reported upon has doubled during the total period under consideration.

2d. Over one-half of these accidents are classified as derailments.

3d. The percentage of derailments per annum decreased from 67 per cent. of the total in the first period to 50 per cent. in the last.

TABLE A.  
RAILROAD ACCIDENTS IN THE UNITED STATES, 1873 TO 1892.  
(From the *Railroad Gazette*.)

| Character of Accident.                                    | Annual Average for Period. |          |          |          |       | Percentage Total per Annum. |          |          |          |       |
|---|----------------------------|----------|----------|----------|-------|-----------------------------|----------|----------|----------|-------|
|   | '73-'77.                   | '78-'82. | '83-'87. | '88-'92. | 1892. | '73-'77.                    | '78-'82. | '83-'87. | '88-'92. | 1892. |
| Collisions:   |                            |          |          |          |       |                             |          |          |          |       |
| Rear.....   | 155                        | 275      | 343      | 464      | 485   | .147                        | .248     | .250     | .221     | .208  |
| Butting.....  | 96                         | 121      | 174      | 286      | 251   | .091                        | .109     | .126     | .136     | .108  |
| Crossing and miscellaneous.....                           | 43                         | 21       | 32       | 209      | 326   | .041                        | .0.9     | .024     | .089     | .140  |
| Total collisions.....                                     | 294                        | 417      | 549      | 959      | 1062  | .279                        | .376     | .400     | .456     | .457  |
| Derailments from—   |                            |          |          |          |       |                             |          |          |          |       |
| Defects of road.....                                      | 149                        | 116      | 192      | 176      | 191   | .142                        | .105     | .140     | .084     | .082  |
| Defects of equipment.....                                 | 76                         | 79       | 108      | 169      | 206   | .072                        | .071     | .078     | .080     | .088  |
| Negligence in operating.....                              | 97                         | 91       | 105      | 125      | 161   | .092                        | .082     | .077     | .060     | .070  |
| Unforeseen obstructions.....                              | 158                        | 128      | 156      | 198      | 179   | .150                        | .116     | .114     | .094     | .077  |
| Unexplained.....  | 228                        | 232      | 187      | 384      | 425   | .217                        | .209     | .136     | .182     | .183  |
| Total derailments.....                                    | 708                        | 646      | 748      | 1052     | 1165  | .673                        | .583     | .545     | .500     | .500  |
| Accidents without collision or derailment—                |                            |          |          |          |       |                             |          |          |          |       |
| To locomotives.....                                       | 23                         | 29       | 39       | 34       | 34    | .021                        | .026     | .028     | .016     | .015  |
| To cars.....  | 13                         | 8        | 18       | 17       | 15    | .012                        | .007     | .013     | .009     | .006  |
| Cars burned while running.....                            | 9                          | 8        | 10       | 12       | 13    | .009                        | .007     | .008     | .005     | .006  |
| Other causes.....   | 6                          | 1        | 8        | 29       | 38    | .006                        | .001     | .006     | .014     | .016  |
| Total accidents without collision or de-<br>railment..... | 51                         | 46       | 75       | 92       | 100   | .048                        | .041     | .055     | .044     | .043  |
| Total train accidents.....                                | 1053                       | 1109     | 1372     | 2103     | 2327  |                             |          |          |          |       |
| Revenue train mileage, millions.....                      | .....                      | .....    | 570.7    | 781.2    | 870   |                             |          |          |          |       |

TABLE B.

RELATIVE FREQUENCY OF DIFFERENT CLASSES OF RAILROAD ACCIDENTS IN THE UNITED STATES.

| Character of Accident.                            | Number of Accidents per One Million Train Miles. |         |       | Train Miles Run to One Accident. |            |             |  |
|---|--|---------|-------|----------------------------------|------------|-------------|--|
|   | '83-'87  | '88-'92 | 1892. | 1883-1887.                       | 1888-1892. | 1892.       |  |
| <b>Collisions:</b>                                |  |         |       |                                  |            |             |  |
| Rear .....  | .80  | .59     | .56   | 1,666,666                        | 1,694,515  | 1,735,714   |  |
| Butting .....                                     | .30  | .37     | .30   | 3,333,333                        | 2,702,702  | 3,446,272   |  |
| Crossing and miscellaneous.....                   | .06  | .27     | .37   | 18,666,666                       | 3,703,703  | 2,702,702   |  |
| Total collisions.....                             | .96  | 1.23    | 1.22  | 1,041,625                        | 812,113    | 819,754     |  |
| <b>Deraillments from—</b>                         |  |         |       |                                  |            |             |  |
| Defects of road.....                              | .34  | .23     | .22   | 2,941,173                        | 4,347,821  | 4,545,454   |  |
| Defects of equipment.....                         | .19  | .22     | .23   | 5,263,157                        | 4,545,454  | 4,347,821   |  |
| Negligence in operating.....                      | .19  | .16     | .19   | 5,263,157                        | 6,250,000  | 5,263,157   |  |
| Unforeseen obstructions.....                      | .27  | .25     | .21   | 3,703,703                        | 4,000,000  | 4,761,904   |  |
| Unexplained .....                                 | .32  | .49     | .49   | 3,125,000                        | 2,040,816  | 2,040,816   |  |
| Total deraillments. ....                          | 1.31   | 1.35    | 1.34  | 763,358                          | 740,740    | 746,268     |  |
| <b>Accidents without collision or derailment—</b> |  |         |       |                                  |            |             |  |
| To locomotives.....                               | .07  | .05     | .04   | 14,285,714                       | 20,000,000 | 25,000,000  |  |
| To cars. ....                                     | .03  | .02     | .02   | 33,333,333                       | 50,000,000 | 50,000,000  |  |
| Cars burned while running.....                    | .02  | .02     | .01   | 50,000,000                       | 50,000,009 | 100,000,000 |  |
| Other causes.....                                 | .01  | .03     | .04   | 100,000,000                      | 33,333,333 | 25,000,000  |  |
| Total accidents without collision or derailment.. | .13  | .12     | .11   | 7,692,817                        | 8,333,333  | 9,080,909   |  |
| Total train accidents ..                          | 2.40   | 2.70    | 2.67  | 416,668                          | 370,370    | 374,581     |  |
| Train mileage in millions.....                    | 570.7  | 761.2   | 870   | .....                            | .....      | .....       |  |

4th. The percentage of collisions per annum increased from 28 per cent. of the total in the first period to 45 per cent. in the last.

5th. The percentage of accidents that were neither collisions nor derailments has been very small.

In an examination of Table B consideration will therefore be given only to collisions and derailments. This table has been prepared to show the relative probability of the occurrence of any particular kind of accident in proportion to the revenue train mileage. This can only be shown for two periods from 1883 to 1887 and from 1888 to 1892, also separately for 1892.

The conclusions to be drawn from this table are as follows :

First. The liability to train accidents has somewhat increased with increasing train mileage; as, for instance, the average distance run for each accident was

|                               |               |
|-------------------------------|---------------|
| For the period 1883-1887..... | 416,666 miles |
| For the period 1888-1892..... | 370,370 "     |

This may be due to an increasing tendency to the publication of such matters, and consequently to a greater number proportionately to mileage being included in the published statements, but so far as these are reliable, they bear out the assertion that train accidents have increased. This does not warrant the inference that the number of personal injuries has increased relatively to revenue train mileage, a matter which will be treated separately.

Second. The increased liability to accidents has been to collisions rather than to derailments ; for instance :

| Period.         | One Collision to | One Derailment to |
|-----------------|------------------|-------------------|
| 1883-1887.....  | 1,041,625 miles  | 812,113 miles     |
| 1888-1892. .... | 763,358 "        | 700,740 "         |

Third. With reference to collisions alone they are classified as to frequency as follows :

| Character.                |        | 1883-87.        | 1888-92.        |
|---------------------------|--------|-----------------|-----------------|
| Rear .....                | One to | 1,666,666 miles | 1,694,515 miles |
| Butting .....             | " "    | 3,333,333 "     | 2,702,702 "     |
| Crossing or miscellaneous | " "    | 16,666,666 "    | 3,703,703 "     |
| Total.....                | One to | 1,041,625 miles | 812,113 miles   |

The proportion of rear collisions to train mileage has remained about the same from one period to the other. There has been a slight increase in butting collisions, but the great increase which has principally affected the total result, has been in what are termed "crossing or miscellaneous."

Fourth. With reference to derailments alone they are classified as to frequency as follows :

| Cause.                   |        | 1883-87.        | 1888-92.        |
|--------------------------|--------|-----------------|-----------------|
| Defects of road.....     | One to | 2,941,173 miles | 4 347,821 miles |
| Defects of equipment.... | " "    | 5,263,157 "     | 4,545,454 "     |
| Negligence in operating. | " "    | 5,263,157 "     | 6,250,000 "     |
| Unforeseen obstructions. | " "    | 3,703,703 "     | 4,000,000 "     |
| Unexplained .....        | " "    | 3,125 000 "     | 2,040,816 "     |
| Total:.....              | One to | 763,358 miles   | 740,740 miles   |

The discussion of the causes of derailment is made less valuable because in so large a proportion of the accidents reported the cause is not given. Referring alone to those for which the cause is given, the relative frequency in proportion to train mileage has increased in those due to defects of equipment and had decreased in those due to defects of roads, to negligence in operating and to unforeseen obstructions.

With this general statement of facts and conclusions we must endeavor to discuss the practicability of remedies, beginning with collisions, classified as rear, butting and crossing or miscellaneous. In doing this it is necessary to get down to particulars, for which I will confine myself to the statement for 1892 as given in the Railroad Gazette for each month separately.

In the year 1892 the number of collisions reported is as follows :



|                                 | Number. | Per cent of Total. |
|---------------------------------|---------|--------------------|
| Rear.....                       | 502     | 47                 |
| Butting.....                    | 323     | 30                 |
| Crossing and miscellaneous..... | 238     | 23                 |
| Total.....                      | 1063    | —                  |

Of these collisions some particulars are given as follows :

|                                 | Total. | Number<br>Particularized. | Per Cent<br>of Total. |
|---------------------------------|--------|---------------------------|-----------------------|
| Rear.....                       | 502    | 230                       | 45                    |
| Butting.....                    | 323    | 220                       | 68                    |
| Crossing and miscellaneous..... | 238    | 64                        | 27                    |
|                                 | 1063   | 514                       | 48                    |

Taking the rear collisions by themselves as particularized, the rear train and the forward train in each can be classified as follows :

|                            | Rear Train. | Forward Train. |
|----------------------------|-------------|----------------|
| Passenger train .....      | 68          | 39             |
| Freight train.....         | 109         | 112            |
| Freight train parted. .... | 35          | 27             |
| Cars not in a train.....   | 2           | 31             |
| Engines not in train.....  | 7           | 9              |
| Miscellaneous .....        | 9           | 12             |

In about one-half of these instances it was a freight train that either ran into the forward train or was run into. This is not surprising since there are so many more freight trains than passenger trains. Indeed the large proportion of passenger trains involved in rear collisions as compared with freight trains is more a matter of surprise, though this is to some extent accounted for by the greater probability that a passenger train collision would become a matter of notoriety and get into the newspapers. But in these reported cases the passenger train has been the rear train nearly twice as often as the forward train, which can be accounted for by its greater speed as tending to make it both more difficult to prevent a rear collision when the passenger train was following, and more easy for the for-

ward train to escape from impending collision when the passenger train was ahead.

In cases where a freight train parted, a collision between the two parts appears in this statement as both the rear and the forward trains. In some cases the rear portion of a parted train appears as the forward train where it has been run into by a following train, and in a few instances as the rear train where it has rolled back down a grade and into the rear of another train.

The number of collisions with loose cars not part of a train is greater than was to be expected. This is largely due to misplaced switches leading an approaching train into a siding occupied by cars, though in some instances the cars were started out of the sidings and ran down grade into a train on the main line.

These rear collisions may be differently classified in accordance with the place at which they occurred, as for instance :

|                       |            |
|-----------------------|------------|
| Between stations..... | 86         |
| At stations.....      | 77         |
| Train parted.....     | 27         |
| Misplaced switch..... | 25         |
| Not stated .....      | 15         |
| <b>Total.....</b>     | <b>230</b> |

With this information as to the circumstances under which these rear collisions took place, reference may be made to the proper remedies, or rather preventives.

Defects in drawgear are accountable for the 27 cases in which trains parted, and negligence of employees for the 25 cases in which a collision was due to a misplaced switch. This leaves 163 collisions nearly equally divided as to the place of occurrence, whether at stations or between stations.

As a general proposition two trains proceeding in the same direction should be separated by an interval of space sufficient for the following train to be stopped at any time

within that interval. To accomplish this the engineer of the following train must be informed whenever the limit of that interval is being encroached upon.

The extent of this interval of safety must vary with the speed of the rear train, the gradient of the track and the efficiency of the appliances provided for bringing the train to a state of rest—for example, as between a light train, equipped with air-brakes proceeding slowly up a one per cent. grade, and a heavy train, equipped with hand-brakes proceeding rapidly down the same grade. Conditions of weather tending to obscure the range of vision or to lessen the adhesion of wheels to the track or of brakes to the wheels may also serve to extend the interval of safety.

When the prevailing conditions extend the limit of this interval beyond the range of vision of the engineer of the following train it must be preserved in other ways. The Standard Code of Train Rules adopted by the American Railway Association recognizes but two: the block system, and the flagman of the preceding train.

In degree of efficiency these two ways are about as far apart as the poles of the earth; one being the latest expression of human ingenuity as applied to railroad practice; the other a makeshift, the inefficiency of which is in proportion to the indolence or stupidity of the flagman. The absolute block system, rigidly applied, will absolutely preserve a stated interval between following trains, but the great cost of its construction and maintenance precludes its use on by far the largest part of the railroad mileage in this country. Where this consideration prevents, reliance is placed upon the watchfulness of the flagman, who is expected, when in his judgment it becomes his duty to secure this interval of safety, to leap from the rear of the moving train, and, armed with red lantern and torpedoes, to plunge boldly into the darkness of night, perhaps facing rain, snow or sleet, hastening toward the headlight of the following train which glares at him as he feels for his footing on the cross-ties upon some lofty

bridge or long trestle. At length he reaches the prescribed distance of twenty-six telegraph poles or about one mile, plants his torpedoes and listens with eager ear for the signal of recall. If, through haste to depart or inadvertence, the signal is not given and his train moves off without him, that flagman may pass the night in solitude, perhaps wet, cold and hungry, or until some train stops at his signal and picks him up. Such are the duties required of a flagman, and it takes pluck and endurance to fulfil them.

It also takes intelligent judgment to determine promptly under the four rules for flagmen, making sixty-eight lines of the Standard Code, just when a flagman must go back, how far he must go, and what he must do when he gets there ; yet this important service is generally entrusted to a novice, to an apprentice in training for promotion to a conductor's place or to some sturdy brakeman, accustomed, it is true, to the hardships of train service, but also to successfully evading them. Either through ignorance or doubt or fear of being left, the flagman may linger around the rear of a train until it is too late for him to stop a following train or he may disappear in the darkness or just around a curve near enough to be handy when recalled, taking the chances as to whether a train is following or not.

It is safe to say that a majority of the rear collisions between stations are due to a failure of the flagman to comply with the rules prescribed by the Standard Code for his guidance. Here is the principal cause of rear collisions, and here a remedy should be applied by relying less upon the intelligent and willing discharge of the duties thus placed upon the flagman. The most intelligent and most experienced man in the train crew should be the engineer ; the best acquainted with the curves, grades, bridges, cuts, embankments and other physical characteristics of the road ; the best informed as to the trains passed and to be passed ; and when a stop is made, or the

train slows down at an unusual place, he knows the cause and the probable detention, not only after it occurs but also before, and can often select the safest place for a stop. It is he, then, not the flagman or conductor, who should determine when the rear of his train is to be protected, and the flagman should act promptly when the signal is given to him, but not before, except in emergencies that can readily be suggested. If the burden be plainly put upon the engineer to determine, and upon the flagman to act, the action of the latter would be controlled by the most intelligent and best informed man of the train crew.

More extended recognition should be given to the use of the time fusee. Its use at night should be obligatory not only by the flagman, but also by the engineer. Whenever he is about to stop or slow down his train at an unusual place, he should drop a lighted ten-minute fusee on the right-hand side of the track on which the train is running, one mile before the stop is made, and an interval of ten minutes ahead of the following train is at once secured by a sentinel that will not desert its post, by a signal whose unmistakable light will illumine its surroundings, let the wind blow and the rain fall as they may. Such a use of the fusee will not do away with the protection afforded by the flagman, but rather increase it, for as he crosses a bridge on his way to the rear he will feel personally safe so long as he sees that purple light blazing between him and the approaching train. Even in the daytime the smoke from a lighted fusee will attract the attention of a following train.

The adoption of these suggestions will measurably reduce the number of rear collisions, but the true preventative is the establishment of an absolute space interval; for any method of time intervals between following trains can afford efficient protection only so long as the trains maintain a uniform schedule speed, can be readily stopped within the recognized interval and are not liable to unexpected delays between signal stations. A heavy

freight traffic cannot be satisfactorily conducted under such a system, yet this was the best method available until it became possible to establish an interval of space by means of the electric telegraph. The fundamental principle of the so-called "block" system is that the engineer of a train approaching a station at the end of a block shall be informed as to whether there is or is not a train between that station and the one next in advance. The interval of safety is thus provided, but the exigencies of traffic have induced what is known as the "permissive" as compared with the "absolute" block system, that is, the permission for a following train to enter a block with the knowledge that it is not clear. This system requires that the rear of the first train in a block must be protected by a flagman, with all the vicious consequences already referred to ; and where the permissive block system is allowed there should be no dependence placed upon flagmen. When a following train enters a block which is not clear the responsibility should rest upon the engineer of the following train alone to prevent a collision. He knows that there is a train in the block. Let him then proceed with such caution as to have his train under proper control.

But even the absolute block system is defective as a protection against rear collisions until the element of human fallibility has been eliminated.

The effort to eliminate human agency begins with the manipulation of the signal at the entrance of the block. If this signal is under the control of the operator at the outlet of the block there is one mind less to make a mistake, and this is sought to be accomplished by the "manual controlled" system. But we have also to guard against the mistake of the operator at the outlet of the block. This man has to determine that the block is or is not clear, and then to control accordingly the display of the signal at the entrance. He must not only know that an engine has passed out of the block, but that every car of its train has also passed out. Even if he be correctly informed that

the block is clear, there must also be a certainty that the signal at the entrance has been properly displayed. Yet another improvement would be attained by eliminating the intervention of this operator also. This has been experimentally accomplished by several devices actuated by the train, simultaneously operating a display of the signals required to block the interval which it is entering and to clear that which it is leaving. Indeed this effect can now be extended to the next block behind the train so that the engineer of a following train may thereby be informed not only as to the condition of the block ahead of him, but also as to the condition of the block ahead of that. It is also practicable to provide appliances which will prevent the signal from indicating that the block is clear so long as there is a car of the train left in the block, an intervening switch misplaced or a rail in the track loosened from its fastenings.

Here we seem to have reached the uttermost limits of the resources at present available for the avoidance of rear collisions, though it is possible to go a step further and prevent their occurrence through the misconduct or neglect of the engineer of a following train, by the introduction of appliances connected with the block signals which shall strike the engine gong, or blow the whistle, or apply the brakes, or even close the throttle-valve on the following train, but these appliances have not yet reached such a stage of efficiency as to call for further notice.

To recapitulate what has been stated, the general adoption of the absolute block system would have prevented nearly every rear collision that took place between stations in 1892. But on perhaps 80 per cent. of the mileage of this country the principal dependence for protection against such collisions is the flagman. Except on roads with very heavy traffic, the establishment of the absolute block system is impracticable because of the increased cost of operation consequent upon its introduction. On such roads the flagman must still be relied upon, and his use-

fulness will be greatly enhanced if he be put directly under the engineer's control by whistle signal, and if the engineer be required to rely upon the fusee to preserve the interval of safety for a following train.

The statistics show that rear collisions take place about as frequently at stations as between stations. Such collisions generally occur from the crew of the train standing at the station believing that the engineer of the following train will approach cautiously, expecting the track at the station to be occupied, while in fact the engineer of the following train approaches the station fully confident that if the track were not clear the flagman would be out a proper distance. Here again the reliance is placed on the flagman with the same unfortunate consequences. The investigation of rear collisions at stations, or where the forward train was standing still, will show that in most of them the flagman was in doubt as to whether he should go back or not. Perhaps the engineer had only stopped for a few minutes to inspect something about the engine, or at a water station where every man on the road ought to know that trains always stop—or, if at a regular station, then the train did not stop just at the usual place. Theoretically the flagman always goes back the prescribed distance whenever the train stops. In practice he only goes back to the proper distance when he knows that a train is following, or that he will have plenty of time to get back to his train, or that some official of the road has his private car attached. The remedies are the same as for collisions between stations; either the absolute block system, or the engineer made responsible for signaling the flagman back. The variety of conditions under which it must be determined whether a flagman should or should not be sent to the rear can be seen by reference to the circular notice attached to this paper.

Another fruitful cause of rear collisions is misplaced switches. There are several remedies for accidents of this kind. In yards the responsibility for a rear collision



should rest with the engineer of a following train. He should understand that he will receive no warning by flagmen, only by switch signals, and should always enter and pass through a yard with his train under such control that it could be stopped at least in its length. This should be insisted upon unless switching is forbidden on the running tracks through the yards. Switches not in yards should be provided with counterweighted switch levers that can only be locked on the main line. When in use, a man would then have to be at the switch, and when not in use the counterweight would bring the switch clear of the main line. Whenever a counterweighted switch lever is not used, a distant signal should be connected with the switch.

To guard against cars being moved out of a siding so far as to foul the main line, a derailing device should be placed at the clearance post.

Butting collisions are about as frequent as rear collisions, yet they are much easier of prevention. No two trains, proceeding in opposite directions on the same track, should ever meet anywhere except at a siding. If the Standard Code is strictly followed this cannot happen, for it gives the absolute right of track to all trains in one direction. This can only be varied by special telegraphic orders, and if the meeting point is correctly given the trains must meet at that point. Where the Standard Code of Train Rules is observed a butting collision cannot occur between stations, except through the carelessness of the train dispatcher, or of the train crew.

Butting collisions do frequently occur at stations and from the same causes that rear collisions occur at the same places ; because the train crew at the station expects approaching trains to be under control, and because the engineers of approaching trains do not have their trains under control. The remedies are the same for the one class of collisions at stations as for the other.

A crossing collision should never occur. Either a cross-

ing should be so protected by signals and derailing switches as to prevent the possibility of collision, or every train should come to an absolute stop, with the engine standing at a stop-post fifty feet from the crossing. In that distance a dangerous speed cannot be attained at the crossing, and when a collision does occur the engineer whose engine struck the other train should be held solely responsible.

The derailments reported in 1892 were classified as follows :

|  |      | Per Cent of Total<br>Particularized. |
|--|------|--------------------------------------|
| Defective track .....                  | 104  | 33                                   |
| Defective equipment.....               | 63   | 20                                   |
| Unforeseen obstructions .....          | 95   | 32                                   |
| Negligence in operating .....          | 49   | 15                                   |
| <hr/>                                  |      |                                      |
| Total particularized, 26 per cent..... | 311  |                                      |
| Unexplained, 74 per cent.....          | 887  |                                      |
| <hr/>                                  |      |                                      |
| Total reported .....                   | 1198 |                                      |

Particulars of derailments have only been obtained of about one-fourth of the cases reported. Of those particularized about one-third each has been caused by defective track or unforeseen obstructions, while the remaining third was about equally divided between defective equipment and negligence in operating.

The reported cases due to defective track are classified as follows :

|                                    |     |
|------------------------------------|-----|
| Broken rail.....                   | 35  |
| Defective switches or frogs.....   | 21  |
| Rails spreading .....              | 14  |
| Defective bridge or trestles ..... | 12  |
| Bad track .....                    | 11  |
| Miscellaneous.....                 | 11  |
| <hr/>                              |     |
|                                    | 104 |

Over one-third of the derailments due to defective track occurred from broken rails. In the majority of cases a

broken rail means a badly worn rail or one of a section too light for the traffic.

The responsibility for a derailment from rails spreading or from bad track should be easily placed upon the proper shoulders, and derailments from defective switches, frogs, bridges and trestles are plainly due to lack of inspection, as also in most of the cases classed as miscellaneous.

The derailments due to defective equipment were 137 in number, of which particulars are given of 63, or 53 per cent, divided as follows :

|                          | On Locomotives. | On Cars. | Total. |
|--------------------------|-----------------|----------|--------|
| Defective wheels.....    | 4               | 17       | 21     |
| Defective axles.....     | 1               | 10       | 11     |
| Defective trucks.....    |                 | 10       | 10     |
| Defective drawgear ..... |                 | 9        | 9      |
| Defective brakegear..... | 1               | 8        | 9      |
| Miscellaneous. ....      | 1               | 2        | 3      |
| Total.....               | 7               | 56       | 63     |

The number of derailments attributed to defective locomotives as compared with defective cars is greatly out of proportion to the number of each in service, but the total of the cases particularized is too small to draw any conclusions, except that the remedy lies in closer inspection.

The derailments due to negligence in operating were 163, of which particulars are given in 49 cases, or 30 per cent., as follows :

|   |    |
|---|----|
| Carelessness in handling switches.....    | 29 |
| Carelessness in handling locomotives..... | 14 |
| Carelessness in track repairs.....        | 4  |
| Miscellaneous.....                        | 2  |
| Total.....                                | 49 |

The switch accidents, as already mentioned in discussing collisions, can be largely reduced by the use of a counter-weighted switch lever, which will prevent switches being carelessly left open on the main line.

Two derailments of passenger trains were caused by derailing devices at crossings, and in each case a collision was probably averted.

But one derailment is reported from an open draw-bridge.

The derailments due to unforeseen obstructions were 165 in number, in which the particulars are given in 95 cases, or 57 per cent., as follows :

|                             |       |
|-----------------------------|-------|
| Cattle.....                 | 36    |
| Washouts.....               | 14    |
| Malicious obstructions..... | 13    |
| Landslides.....             | 8     |
| Miscellaneous.....          | 24    |
|                             | <hr/> |
|                             | 95    |

The principal single cause, cattle on track, could be prevented by fencing. In the majority of the other cases the remedy is closer inspection. The other train accidents, which were neither collisions nor derailments, were 95 in number, of which particulars were given in 42 cases, or 44 per cent., as follows :

|                                     |       |
|-------------------------------------|-------|
| Locomotive explosions.....          | 18    |
| Other accidents to locomotives..... | 9     |
| Miscellaneous.....                  | 15    |
|                                     | <hr/> |
|                                     | 42    |

Some of the train accidents as above classified were more or less involved either as a cause or effect with bridges and fires, and it is therefore somewhat interesting to treat of them as so related.

In 21 cases of derailment caused by condition of bridges the particulars are as follows :

|                                     |       |
|-------------------------------------|-------|
| Bridge damaged by flood.....        | 8     |
| Bridge damaged by fire.....         | 5     |
| Bridge otherwise defective.....     | 6     |
| Insufficient bridge signals.....    | 2     |
|                                     | <hr/> |
| Due to insufficient inspection..... | 21    |

## Injury to bridges by train accidents :

|                     |       |
|---------------------|-------|
| By derailments..... | 7     |
| By collisions.....  | 5     |
|                     | <hr/> |
|                     | 12    |

In seven derailments and one collision the trains were thrown off a bridge, so that it may be said that in these eight cases, and in the twelve cases of injury to bridges by derailment and by collision, efficient guard rails would have prevented the resulting damage.

As with bridge accidents so it is with accidents by fire : they may be either a cause or an effect.

In 61 cases of fires on trains, of which particulars are given, the causes were as follows :

|   | Pass.    | Freight. | Total.   |
|---|----------|----------|----------|
| Rear collision—Engine set train afire....           | 5        | 21       | 26       |
| “ “ Caboose stove.....                              | ..       | 2        | 2        |
| “ “ Lamp in horse car.....                          | ..       | 1        | 1        |
| “ “ Lamp in baggage car....                         | 1        | ..       | 1        |
| Butting collision—Engine set train afire..          | 2        | 3        | 5        |
| “ “ Stove in express car...                         | 1        | ..       | 1        |
| Crossing collision—Stove in passenger car           | 1        | ..       | 1        |
| Derailement—Stove in passenger car.....             | 11       | ..       | 11       |
| “ Fire from engine.....                             | 1        | 3        | 4        |
| “ Contents of freight car.....                      | ..       | 3        | 3        |
| Illuminating-gas ...                                | 1        | ..       | 1        |
| Case of gasoline dropped from preceding train ..... | 1        | ..       | 1        |
| Total.....  | <hr/> 24 | <hr/> 33 | <hr/> 57 |
| Set on fire by locomotive .....                     | 8        | 22       | 35       |
| Set on fire by stoves.....                          | 13       | 2        | 15       |
| Set on fire by lamps .....                          | 1        | 1        | 2        |
| Miscellaneous.....                                  | 2        | 8        | 5        |
| Total.....  | <hr/> 24 | <hr/> 33 | <hr/> 57 |

The remedy against fires caused by locomotives is plainly to reduce the number of collisions, and especially of rear collisions: that against fire caused by stoves is to replace them with safer heating apparatus.

In general, the diminution in railway accidents must be brought about by increased efficiency in appliances, in regulations, in discipline and in inspection.

Under the head of appliances, experience shows that rear collisions between stations can be greatly diminished by a more extended use of the block system, that many collisions are caused by switches left wrong which could not occur with counterweighted switch levers, that cars could not be moved out of sidings if prevented by derailing devices, that derailments at switches could be prevented by the use of safety switches, that guard rails on bridges and trestles would often prevent derailments and the consequent injuries to trains and structures, and that steam-heating apparatus should replace stoves in passenger cars.

As to efficient regulations, the Standard Code of Train Rules of the American Railway Association is the result of the experience of those best qualified to frame such a code. Its general adoption has done much to bring about a uniformity of practice throughout the country, and with it to reduce the possibility of accidents due to trainmen changing from one road to another. As already suggested, it would be an improvement for the engineer of a train to be required to make use of the fusee as a rear protection, and also to put the flagman more immediately under his direction.

The Association code of rules for the movement of trains by telegraphic orders is an admirable piece of work, and has been even more generally adopted than the code of train rules. Where it is rigidly enforced a butting collision could only arise from the carelessness or recklessness of an employee.

There is need for similar Standard Codes regulating the conduct of employees in other matters incidental to the movement and handling of trains.

Perhaps one of the greatest fields for improving the train service in this country is that of discipline. The

lack of unquestioning obedience to authority and of prompt compliance with established rules is at the bottom of more railway accidents than every other cause put together. This is rarely shown in the newspaper accounts ; indeed it is only ascertained in most cases by a thorough investigation of all the circumstances. The facts as to the chances taken daily by reckless or indolent or careless employees in flagrant disregard of carefully devised regulations and of even the common dictates of prudence would, if generally known, do much to bring about an improvement in this respect. Public opinion would then hold employees responsible in many cases of accident where now there is a senseless or unjust abuse of corporations and officials. It is now so difficult to get a jury to look upon the infraction of a train rule by an employee as a crime, that railroad companies content themselves with discharging men in such cases, who are then free to find employment elsewhere and to repeat the offense, and the attempt to keep a record of such offenders is denounced as odious blacklisting. Railroad managers have to contend against a growing resistance to restraint and reproof, and a disposition to oppose the interests of the company in matters which do not affect the personal interest of employees either one way or another, thus rendering it difficult to enforce discipline even where the safety of life and property are involved. Their efforts need to be reinforced by public opinion, by the press and by the courts, for strict discipline and prompt obedience to orders under the conditions of exposure to weather, to danger, and even to death, are as necessary and as meritorious in railroad service as in military service.

In this connection railroad managements are themselves open to censure for inefficient supervision of train service. They have the lesson to learn which centuries of experience have taught to the creators and leaders of military organizations—that it is one thing to give an order, and another thing to see that it is enforced. Close inspection

insures efficiency of appliances or regulations and of discipline, and this is greatly lacking even on the best railroad systems in this country. Money expended in salaries for men to do nothing else but see that rules are observed is looked upon as wasted. What is wanted is, not spies nor detectives, but a staff of inspectors reporting directly to the general manager outside of any department officials. This is what is done in armies, and the positions are held in honor and filled by the best men on the general's staff. With such a system of inspection, the management does not have to wait for a bridge to fall down to learn that it was rotten, or for a score of lives to be lost in an accident to know that train rules were habitually disregarded.

As stated in the beginning of this paper, the personal injuries arising from railway accidents have attracted the attention of State Railway Commissions rather than the causes of such accidents, and some reference may therefore be made to this aspect of the subject.

The classes of persons suffering injuries from railway accidents are passengers, employees and trespassers, as well as a fourth class of persons that cannot properly be included under either of these heads. I have therefore prepared some figures as to the number of persons injured by train accidents in 1892, which have been already analyzed as to other causes. Classified as stated, the results are as follows.

The total number of persons injured in these accidents were :

|              |              |
|--------------|--------------|
| Killed ..... | 664          |
| Injured..... | <u>2,252</u> |
| Total.....   | 2,916        |

Divided as between :

|                    |       |
|--------------------|-------|
| Passengers.....    | 1,150 |
| Employees.....     | 1,648 |
| Trespassers.....   | 85    |
| Miscellaneous..... | 33    |



These casualties resulted from :

|                      |       |
|----------------------|-------|
| Collisions.....      | 1,458 |
| Derailments.....     | 1,379 |
| Other accidents..... | 79    |

About one-third more passengers were killed than employees. The principal causes of personal injuries were :

|                                     | Killed. | Injured. | Total. |
|-------------------------------------|---------|----------|--------|
| In rear collisions.....             | 116     | 462      | 578    |
| In butting collisions.....          | 200     | 525      | 725    |
| Derailment from broken rails.....   | 15      | 196      | 211    |
| Derailment from cattle on track ... | 30      | 98       | 128    |

There were 61 accidents, in which the trains took fire, and from these fires 10 passengers and 3 employees were killed and 13 passengers injured.

The resulting injuries from train accidents vary of course greatly with the number of persons exposed in each, while serious loss of life occasionally results primarily from irregularities which are themselves of but little consequence and of rare occurrence. The appended table (Table C) gives separately each accident reported in 1892 which resulted in ten or more persons being injured. A derailment on a high bank caused by a broken rail resulted in 2 deaths and 34 injured. Another to a work train, with 300 men on board, also happened on a high bank, plunging the train into a river, drowning 3 and injuring 30. Another derailment caused by a trestle giving way, after having been weakened by a flood, resulted in drowning 7 and injuring 30. A passenger train ran past a block signal and plunged into the rear of another passenger train, killing 12 passengers and injuring 23. A butting collision, growing out of the mistaken reading of a new time card, led to the death of 5 and the injury of 43 others. A freight train ran past a block signal into the rear of a passenger train, killing 9 and wounding 32.

TABLE C.

## SERIOUS ACCIDENTS—PERSONAL INJURIES.

|                    | Killed. |     |     | Wounded. |     |     | Total. |     |     | Remarks.   |
|--------------------|---------|-----|-----|----------|-----|-----|--------|-----|-----|--|
|                    | Pas.    | Em. | To. | Pas.     | Em. | To. | Pas.   | Em. | To. |  |
| Butting collision. | 1       | 2   | 3   | 6        | 2   | 8   | 7      | 4   | 11  | One train standing at station; other approached not under control.   |
| Derailment.....    | 2       | ..  | 2   | 29       | 5   | 34  | 31     | 5   | 36  | Broken rail on high bank.  |
| “ .....            | 2       | ..  | 2   | 12       | ..  | 12  | 14     | ..  | 14  | Broken rail; sleeper overturned, and two burned up in it.  |
| “ .....            | .       | ..  | ..  | 8        | 3   | 11  | 8      | 3   | 11  | Janney-Miller draw-head pulled out; car struck coal chute.   |
| “ .....            | .       | ..  | ..  | 8        | 2   | 11  | 8      | 3   | 11  | Broken rail.   |
| “ .....            | ..      | ..  | ..  | 13       | 2   | 15  | 13     | 2   | 15  | On high bank; unexplained.   |
| “ .....            | .       | ..  | ..  | 12       | 1   | 13  | 12     | 1   | 13  | Roadbed weakened by rain.  |
| “ .....            | ..      | ..  | ..  | 15       | ..  | 15  | .      | .   | 15  | Broken driving axle.   |
| “ .....            | ..      | 2   | 2   | ..       | 15  | 15  | ..     | 17  | 17  | Work-train; broken wheel.  |
| “ .....            | .       | 3   | 3   | ..       | 30  | 30  | ..     | 33  | 33  | Work-train, down bank into river; 300 men on train; unexplained.   |
| Butting collision. | 1       | 5   | 6   | 12       | 3   | 15  | 13     | 8   | 21  | New time-card; frt. man forgot change of pass. train.  |
| “ “                | 8       | 1   | 9   | 20       | ..  | 20  | 28     | 1   | 29  | Pass. train backing on trestle; sleeper fell over, frt. ran into it; pass. condtr. disregarded orders.                     |
| Derailment.....    | 6       | 1   | 7   | 25       | 5   | 30  | 31     | 6   | 37  | Trestle weakened by flood; train turned over and people drowned.   |
| “ .....            | ..      | 3   | 3   | ..       | 7   | 7   | ..     | 10  | 10  | Culvert weakened by rain.  |
| “ .....            | .       | 1   | 1   | 11       | ..  | 11  | 11     | 1   | 12  | Cattle, engine, tender and sleeper in river.   |
| Rear collision.... | 12      | ..  | 12  | 23       | ..  | 23  | 35     | ..  | 35  | First pass. train stopped, second ran past block.  |
| “ “ ....           | 3       | ..  | 3   | 7        | ..  | 7   | 10     | ..  | 10  | Pass. train standing at station; frt. train not under control.   |
| Butting collision. | 4       | 1   | 5   | 43       | ..  | 43  | 47     | 1   | 48  | Pass. and excursion; new time-card; excursion condtr. and engr. mistook time it took effect; thought P.M. when it was A.M. |

TABLE C.—Continued.

|                    | Killed. |     |     | Wounded. |     |     | Total. |     |     | Remarks.  |
|--------------------|---------|-----|-----|----------|-----|-----|--------|-----|-----|---|
|                    | Pas.    | Em. | To. | Pas.     | Em. | To. | Pas.   | Em. | To. |   |
| Butting collision. | 1       | ..  | 1   | 3        | 6   | 9   | 4      | 6   | 10  | Pass. train condr. careless in examining junction register.   |
| Collision.....     | ..      | ..  | ..  | ..       | 20  | 20  | ..     | 20  | 20  | Freight and work train; unexplained.  |
| Derailment.....    | ..      | ..  | ..  | 13       | ..  | 13  | 13     | ..  | 13  | Rails spread; pass. car turoed over.  |
| ".....             | ..      | ..  | ..  | 5        | 7   | 12  | 5      | 7   | 12  | Defective switch; wrought-iron lug on switch-rail broke.  |
| ".....             | ..      | 5   | 5   | ..       | 25  | 25  | ..     | 30  | 30  | Work-train; cattle.   |
| ".....             | ..      | 7   | 7   | ..       | 6   | 6   | ..     | 13  | 13  | On high trestle; fell over; unexplained.  |
| Side collision.... | ..      | ..  | ..  | 12       | ..  | 12  | 12     | ..  | 12  | Car on side-track; pass. engine struck it; pass. cars turned over.  |
| Derailment.....    | 2       | ..  | 2   | 10       | ..  | 10  | 12     | ..  | 12  | Misplaced switch; car turned over.  |
| ".....             | ..      | ..  | ..  | 12       | ..  | 12  | 12     | ..  | 12  | Engine ran into train-shed too fast, over butting-block into people on platform.  |
| ".....             | ..      | 2   | 2   | ..       | 8   | 8   | 2      | 8   | 10  | Car derailed and rolled down bank.  |
| Rear collision.... | ..      | ..  | ..  | 20       | ..  | 20  | 20     | ..  | 20  | Empty cars let down grade at station by hand - brakes; lost control and ran into rear of pass. train, which was standing. |
| Derailment.....    | 4       | ..  | 4   | 13       | ..  | 13  | 17     | ..  | 17  | Fell through trestle weak'd by freshet.   |
| ".....             | 2       | ..  | 2   | 16       | ..  | 16  | 18     | ..  | 18  | Mixed train; frt. car door fell off; derailed pass. car fell down bank, turned over two persons standing beside track.    |
| ".....             | ..      | ..  | ..  | 13       | ..  | 13  | 13     | ..  | 13  | Sleeping-car turned over.   |
| Rear collision.... | 9       | ..  | 9   | 32       | ..  | 41  | ..     | ..  | 41  | At station frt. train ran past automatic signal.  |
| Butting collision. | ..      | 9   | 9   | ..       | 4   | 4   | ..     | 13  | 13  | Work-train in time of pass. train.  |
| " ".....           | 3       | 8   | 11  | 7        | 1   | 8   | 10     | 9   | 19  | Condr. and engr. frt. train on side-track asleep, train passed; they thought it was pass. train.                          |
| Derailment.....    | ..      | 4   | 4   | 18       | 4   | 22  | 18     | 8   | 26  | Loose rail; fastenings removed maliciously.   |

TABLE C.—*Continued.*

|                    | Killed. |     |     | Wounded. |      |     | Total. |      |      | Remarks.  |
|--------------------|---------|-----|-----|----------|------|-----|--------|------|------|---|
|                    | Pas.    | Em. | To. | Pas.     | Em.  | To. | Pas.   | Em.  | To.  |   |
| Butting collision. | 5       | 3   | 8   | 12       | 6    | 18  | 17     | 9    | 26   | Agt. had order to hold frt. train, but tho't it was annulled by subsequent order.   |
| Derailment.....    | 1       | ..  | 1   | 10       | 1    | 11  | 11     | 1    | 12   | Defective switch; car overturned.   |
| " .....            | ..      | 2   | 2   | 14       | ..   | 14  | 14     | 2    | 16   | Broken rail.  |
| Rear collision.... | ..      | 1   | 1   | 20       | 2    | 22  | 22     | 3    | 23   | Pass. train ran into rear of gravel standing on main line; engine had gone to station for coal; flagman asleep in caboose; pass. engine thrown down bank. |
| Derailment.....    | 2       | ..  | 2   | 10       | ..   | 10  | 12     | ..   | 12   | Pass. car down the bank and turned over.  |
| " .....            | 1       | ..  | 1   | 13       | ..   | 13  | 14     | ..   | 14   | Broken car-wheel; train down bank; 2 sleepers in trestle.   |
| " .....            | ..      | ..  | ..  | 11       | ..   | 11  | 11     | ..   | 11   | High wind; 4 cars blown off; engine left on track.  |
| Rear collision.... | 1       | ..  | 1   | 14       | ..   | 14  | 15     | ..   | 15   | Pass train; unexpected stop with rear of train 150 feet outside pneumatic signal.   |
| " " ....           | ..      | 7   | 7   | ..       | 5    | 5   | ..     | 12   | 12   | Freight train ran into caboose of wrecking train; car afire; 3 burned to death.   |
| Butting collision. | ..      | 4   | 4   | 9        | 1    | 10  | 9      | 5    | 14   | Pass. and frt. train.   |
| Side collision.... | ..      | ..  | ..  | 5        | 7    | 12  | 5      | 7    | 12   | Engine and 2 cabooses taking siding struck by pass. engine.   |
| Derailment.....    | ..      | ..  | ..  | 25       | ..   | 25  | 25     | ..   | 25   | Broken rail; 5 pass. cars ditched.  |
| " .....            | 2       | ..  | 2   | 15       | 2    | 17  | 17     | 2    | 29   | Pass. car down bank; cars took fire; 2 cars burned up.  |
| In 50 accidents .. | 30      | 38  | 68  | 257      | 33   | 290 | 285    | 71   | 358  |   |
| Total reported.    | 133     | 472 | 605 | 1025     | 1166 | 491 | 1158   | 1638 | 2796 |   |

These examples are given to show that any class of collision or derailment may result in great loss of life. In seeking a remedy our attention should not be so much

attracted to those which for this reason have a tragic interest as to those causes which investigation shows to have been most abundant in accidents. So far as information may be gained from the train accidents of 1892, but few of them can be attributed to causes beyond the control of man. In most of them the remedy is to be sought in more efficient appliances, regulations, discipline and inspection.

## APPENDIX TO ADDRESS ON RAILROAD ACCIDENTS, ETC.

## RULES GOVERNING FLAGMEN.

*Savannah, Florida & Western Railway Company, Charleston & Savannah Railway Company, Brunswick & Western Railroad Company, Alabama Midland Railway Company.*

OFFICE OF GENERAL MANAGER. }  
SAVANNAH, GA., Oct. 25, 1890. }

Circular No. 2.

## TO FLAGMEN.

Your attention is hereby called to the rules which prescribe your duty under the different circumstances in which you may be placed.

## ON PASSENGER TRAINS.

No. 1. At regular stations noted on schedule as a stopping place for that train, and standing at the usual place for it to stop. See Train Rule 229. If your train stands over five minutes, you must go back with danger signals and protect your train, as provided in Rule 99.

No. 2. At regular stations noted on schedule as a stopping place for that train, but not standing at the usual place for it to stop. This is an unusual stop, and you must comply with Train Rule 96.

No. 3. Stopping at stations not noted on schedule as a stopping place for that train. This is an unusual stop. See Train Rule 96.

No. 4. Stopping for wood or water between stations. This is an unusual stop, to be governed by Rule 96.

No. 5. Stopping between stations for engineer to examine something about his engine. This is an unusual stop, and you must be governed by Train Rule 96.

No. 6. Stopping between stations to pack hot boxes. This is an unusual stop. You will be governed by Train Rule 96.

No. 7. Any other stop between stations. See General Manager's Order No. 300, also No. 299, which reads "all other stops must be considered unusual stops." You will be governed by Train Rule 96.

#### FOR FREIGHT TRAINS.

No. 8. At regular stations not noted on schedule as a stopping place for that train, and standing at the usual place for it to stop. You will assist the conductor in shifting switches, discharging freight, etc.; but if the train is delayed twenty minutes beyond its scheduled leaving time, you will be governed by Train Rule 97.

No. 9. At regular stations noted on schedule as a stopping place for that train, but train overlapping switch. You must consider this an unusual stop, and you will comply with Train Rule 97.

No. 10. At regular stations noted on schedule as a stopping place for that train, but not standing at the usual place for it to stop. This is an unusual stop, and you must comply with Train Rule 97.

No. 11. Stopping at stations not noted on schedule as a stopping place for that train. This is an unusual stop, and you must comply with Train Rule 97.

No. 12. Stopping for wood or water between stations. This is an unusual stop, and you will be governed by Train Rule 97.

No. 13. Stopping between stations for engineer to examine something about his engine. See General Manager's Order No. 300, also General Manager's Order No.

299. The above stop is an unusual stop, and you must be governed by Train Rule 97.

No. 14. Stopping between stations to pack hot boxes. This is an unusual stop, and you will be governed by Train Rule 97.

No. 15. Any other stop between stations, cause unknown to flagman. See General Manager's Orders 299 and 300. Stops of this character must be considered unusual stops, and you must be governed by Train Rule 97.

These instructions do not relieve the conductors or engineers from the responsibility which the rules prescribe. Your attention is called to Train Rule 47, and when the signal is given for flagman to go back, the warning must be immediately obeyed.

When engineers throw off lighted fusees, as per General Manager's Order No. 300, you will understand that it is his intention to stop, and you must be prepared to go out immediately with proper danger signals.

At night you must remember to comply with Train Rule 230 as to use of fusees.

Never forget that you are placed at the rear of the train to protect life and property, and that it is in the darkness of night, in fogs and in storms, that your prompt attention to duty is most valuable.

It is better for your own peace of mind that you should get wet or be left on the road, cold and hungry, than for you to see life lost, perhaps your own friends mangled and crippled, or engines and cars broken up in a collision through your own carelessness or laziness, or because you did not go back when you knew that you ought to.

#### TO ENGINEERS AND CONDUCTORS.

Your attention is called to this circular. See that flagmen understand it and act upon it. Pay strict attention to what is required of you as to giving whistle signals or verbal instructions to flagmen ; also as to dropping fusees



in ample time when you know in advance that you intend to stop at an unusual place. You will thereby assist your officers in protecting your own lives, as well as the lives and property which it is your duty to protect. You will also add to the reputation of the railroad company which employs you, and in which I believe you take as much pride as I do.

H. S. HAINES, General Manager.

## RAILROAD DEVELOPMENT, ITS PAST, PRESENT AND FUTURE.

(Address Delivered in Festival Hall, World's Columbian Exposition,  
on Railroad Day, September 16, 1893.)

Because of the event which we commemorate to-day, this is an appropriate occasion on which to link the past and future of railroad development together, a past, brief in point of time, but replete with great accomplishment ; a period which produced men of heroic cast well fitted to grapple with the foundation problems which barred their way. When we look back to that primitive era when all this ground was virgin soil, when every step onward, whatever direction might be chosen, was obscured by forests of doubts and obstructed by mountains of difficulties we envy our predecessors the joy of the contest in which they were then engaged, the greatness of the victories which they won. For they were the pioneers who cleared the forests that we might plow the fields.

I shall now ask your attention while I attempt briefly to outline some of the problems which presented themselves to the men who brought the art of transportation by rail to its present state and we shall not have to look back very far when we remember that at the trial which was to determine whether locomotives should be used upon the Liverpool & Manchester Railroad, one of the competitors was Ericsson, who has not long passed away from us.

The first of these foundation problems was to produce a better covering for a traveled road than was afforded by stone pavement, for the generation of Telford and Macadam seemed to have said the last word on that subject. This problem was solved by the use of a metallic covering narrowed down to the width of the wagon tire, which was

itself most ingeniously restrained in its path by attaching a flange to the tire instead of the track. This invention was typified by the name which was given to it of "rail-road," a term pregnant with greater promise of material progress in civilization than any which has since been coined, and the first problem of the flange on the wheel had been solved for all time to come. It was one of those great difficulties which I have just spoken of as tending to make us envious of those who had them to solve. And what a happy solution ! Jessop, the man who is credited with having solved it, passed away unhonored and unsung. If it were to be solved to-day, it would be protected by a patent and the inventor would soon count his millions.

The next problem was the form of the rail, and after passing through experimental stages of cast iron slabs or racks, of strap iron and flanged rail, two types were developed, the double-header rail which our English brethren have retained and the T section, adopted by us, and for which we are indebted to Vignoles; who was, I believe, at one time employed in South Carolina as a surveyor. The T rail seems to be the type which has come to stay, for with our increasing rolling weights, the rail must more and more assume the functions of a loaded girder for which the T section is the ideal form ; and so we may look upon that as another of the foundation problems which was solved by our predecessors.

The improved surface suggested by a railroad soon suggested possible loads and speeds beyond the powers of a horse, and the horse power of Watt and Bolton was put upon its legs by Blenkinsop and upon wheels by Rastrick, Hackworth, Braithwaite, Ericsson and the Stephensons, and the locomotive, the iron horse, was harnessed to the railroad wagon with results which so far exceeded the expectations of its creators as to excite alarm by reason of that very success. Here again I would pause for a moment that you may join in with me in a sigh of regret that those sturdy Britons should have deprived our generation and

our country of the glorious satisfaction which can never be ours, and which they so keenly enjoyed in their own grim way—to have been the first to avail themselves of this application of the newly acquired control of steam—to transform inanimate metals into an animated machine that should rush through space at a speed never before attained with human beings, yet more responsive to the controlling mind than any creature ever tamed by man. Which of you does not envy such opportunities and sigh that there are no more such worlds to conquer? We who are here to-day to testify to the rank and station of our country in this recently created field of human enterprise and ingenuity should not forget that on the 10th of January, 1829, Mr. Rastrick exhibited at Stourbridge a locomotive intended for the Delaware & Hudson Canal Co. while the noted contest of locomotives on the Liverpool & Manchester Railroad did not take place until October 1829,—and farther, that the first freight train which ran from Liverpool to Manchester was laden with American cotton.

The locomotive as inherited from these early champions has not since been altered in its principal features. Its success was due to three devices, the tubular boiler suggested by Henry Booth, treasurer of the Liverpool & Manchester Railroad Co., the slide valve and the exhaust blast. We have enlarged upon their dimensions and refined upon their details, but the flying giant of to-day is essentially the counterpart of the "Little Rocket," and we might look upon the locomotive as an exhausted problem but for the recent application of the compound principle which for a brief period prevailed over the low-pressure condensing engine for marine service, until superseded by the triple-expansion system.

Although the railroad track preceded the locomotive, when the prestige of the latter had once been established the track had to conform to its requirements; inclined planes gave place to gradients practicable for locomotives,

and the demand for higher speeds and heavier loads has kept alive a struggle between engine builders and road builders, from that day to this.

The pressure became so great that relief was sought in widening the gauge and this led to the "battle of the gauges" which at one time had all England aroused, with engineers and lawyers marshalled in rival hosts under the leadership of Stephenson, Brunel, and their compeers. The contest was renewed on this side the ocean, first with the broad gauge and then with the narrow gauge, to be finally set at rest on June 1, 1886, by the general adoption of the original Liverpool & Manchester Railroad gauge, and so that problem was solved.

The track and the locomotive were accepted by the first generation of American railroad men in the form in which they left the hands of their British brethren, with one exception; an exception which either by direct tendency or by reactive effect has led to essential departures in devices, appliances and methods in this country from those which had been adhered to in Europe. I refer to the application to locomotives and rolling stock of the bogie or four wheel truck, commonly attributed to Jervis. The use of this truck enabled us to operate a cheaply built railroad with a degree of success which could not have been obtained with a totally rigid wheel base, and as a consequence, made possible the rapid extension of our railroad system. It led to our retaining the outside connected cylinders as first designed by Stephenson, in connection with the coupled driving wheels as used by Braithwaite and Ericsson, which in Great Britain were replaced by the inside connected crank axle with single drivers. The use of the four wheel truck under rolling stock speedily induced the substitution of the long bodied passenger car with end platforms in place of the coach body carriages with side entrances and consequently to our differently organized train crews.

For these reasons it may be fairly claimed that the four

wheel truck was the original cause for our fundamental variations from the general system of railroad operations which now prevails in Europe.

In another respect we departed from the ways of our teachers. This was a wooded country, its hills and plains covered with thick forests affording timber of large dimensions and of excellent quality. Our first generation of railroad engineers availed themselves of this abundant and accessible material for the construction of bridges with spans exceeding those which were practicable at a reasonable cost if built of masonry. Here they solved the problem of panel trusses, which by a yet further development, originating with Bollman and with Albert Fink, who is still with us, the honored object of our emulation and esteem—has made our pin connected bridges confessedly superior to the riveted trusses beyond the seas.

At this point I feel that I may take an inventory of what we are indebted to the first generation, to the grandfathers of the younger railroad men who are here to-day. We owe to them the rail section as we have it, the flanged wheel, the locomotive, the four-wheel truck, the truss bridge, and since we come to think of it, this makes up in substance about all that there is of the railroad of to-day. Our addition to their work has virtually been in developing their ideas, with some exceptions to be noted hereafter.

If this was the work of the first generation what shall we claim for our own generation, for those of us who are tending toward that period of life in which we shall lag superfluous on the stage, sententious critics of those who are relieving us of our burdens. We may say that our work was largely the extension of the railroad system to meet the demands of the millions who were flocking to the rich prairies of the west, eager to hear the locomotive whistle echoing in their ears before the crops were seeded for which they sought a market. It was a period of reorganization of train service and of traffic methods to provide for the swelling tide of business which rolled between

the east and the west, between the north and the south, in steadily increasing volume. During this period were developed through passenger train schedules, through passage tickets and baggage checks and way bills, all that network of intercommunication to which the people entrust themselves and their baggage, their products and their merchandise for transportation from one end of this broad land to the other without knowing or caring over whose roads or over how many they go, feeling assured that they will reach their destination safely and at the appointed time.

These were the problems solved by the transportation men of our days, and it was in recognition of their good work that so many of them came to the front to share the honors which before had gone principally to the engine builders first and then to the road builders. It was the perfection of this system of intercommunication which paved the way for the introduction of the sleeping cars which have made the names of Pullman and Wagner so grateful to the ear of those who had before journeyed by day and by night, travel worn and travel stained, unable to rest their heads or stretch their legs. The sleeping car, the one thing which makes long and continuous journeys comfortable, I had almost said possible, seems to have reached its ultimate stage of improvement.

Another epoch of railroad development commenced with the method devised by Bessemer for the direct conversion of pig iron into steel. Those of us who saw our iron rails wearing out and knew not where to obtain the means to replace them, looked with envious eyes upon the beautiful tracks laid by our wealthier neighbors with steel costing \$100 per ton. Little did any of us look forward to the day when iron rails would utterly disappear from the face of the earth! Yet it seems to us now that with a steel rail of 100 lbs. section with heavy joint fastenings and properly ballasted there is nothing farther to seek in the way of a railroad track. Steel, too, has lent itself to

greater deeds of engineering in bridge construction and largely to the establishment of a new type of bridges in the cantilever, surpassing in reality our previous ideas of possibility in length of spans. The application of compressed air to sub-aqueous foundations has been a collateral aid to these undertakings, though compressed air for this purpose had been employed in the Southern States prior to 1860.

The construction of passenger cars has not materially changed. The present type seems destined to remain as the American system, the six-wheeled trucks, the vestibuled platforms we may claim as recent improvements, but for the great invention which next to steel rails has marked this epoch of advancement in railroad methods we are indebted to Geo. Westinghouse, Jr., for without air brakes where should we have been to-day ; with their assistance what have we not accomplished in increased speed and safety of passenger trains : what will we not be able to accomplish hereafter with freight trains. Nor must I pass unnoticed the aid which we have received in this connection by the invention of automatic close coupling devices with which the names of Janney, Gould, McConway and others, and particularly of our master car-builders, must be associated. In transportation methods there have been great changes, too, in matters of principle, due to the adaptation of the electric telegraph to train service, originating, it is said, with Moran on the Erie Railroad. In Europe the telegraph was applied in a different way, for as the roads there were double tracked and the movement of trains largely controlled by fixed signals, the telegraph was applied to transmitting information to the signalmen to aid in keeping following trains apart. But upon our single track roads the telegraph was used to issue orders directly to opposing trains. Hence there has grown up with us a system of train orders, differing fundamentally from anything in use in Europe, and which has rather limited than displaced that independent manage-



ment of a train by its engineer and conductor, which has characterized American railroad management from its inception ; a system which has tended largely to the development of intelligence and character among our railroad men and to which is probably due the presence of so great a proportion of men from the transportation department among the higher officials in charge of our railroad operations.

The organization of our railroads has been much improved since 1870. The aggregation of separate companies into large systems, the rapidly increasing traffic, the growing recognition of the importance of technical knowledge, have all tended to a more marked division of authority and to a further specialization of duties among the staff. The lines have been clearly drawn between the financial, the legal, the traffic and the operating departments. It is recognized that the area in each is too extensive to be adequately covered by any one mind, and the old fashioned ubiquitous railroad manager will no longer suffice for the satisfactory direction in detail of all the affairs of a modern railroad corporation. That something may be lost in breadth of view and in directness of purpose by these changes of organization is to be expected. But even as the field for mechanical ingenuity was largely covered by the first generation of railroad men, so has the field for creating great enterprises for controlling the railroads of a state or of a group of states and even for spanning the continent been measurably exhausted by the generation which is now at the helm.

When the railroad mileage of this country touched 175,000 miles and the annual increase amounted to 10,000 miles, the limit of broad extension and of founding new railroad systems seemed to have been reached and also a standpoint attained from which we can look backward upon the past and take fresh breath to look forward to the problems which the future has in store. To doubt that such problems there are and of momentous importance to

us and to those who are to come after us, would be to doubt the destiny of our nature and the genius of our people. But that these problems will be in a great measure new to us and that they will be solved in an unexpected way we may believe because of our past experience.

Who could have expected that the broad and level turn-pike should have been succeeded by the narrow band of iron; the prancing coach horse and the plodding roadster by a machine fed on fire and water; the extreme speed of fifteen miles per hour by the present standard of sixty? Or who could have looked forward to the substitution of iron by steel with the attendant consequences, or to the rapid construction of single span bridges over broad estuaries, or to the manifold uses of electricity and compressed air?

The problems immediately before us are of a conflicting character. In the face of diminishing freight rates we are called on to handle increasing volumes of business at greater speed and with greater safety. Just as new tools and appliances and methods in other departments of industry have been so adapted to the purposes for which they are intended as to enable their possessors to undersell and bankrupt their competitors who cling to the old devices, so it must be with railroads. If we are to operate passenger trains habitually at a speed exceeding sixty miles per hour, it must be upon tracks specially devoted to that service with grades not exceeding twenty feet to the mile and curves of not less than two thousand feet radius, without grade crossings or facing switches, and protected by automatic block signals covering the distance in which the train can be stopped. On these tracks, cattle, perishable and other high class traffic could also be moved with suitable equipment, but the grosser commodities, grain, provisions, coal, ore, lumber, etc., must be handled on separate tracks of similar alignment and grades, and equally as well protected against obstructions or collisions. Over these tracks freight trains loaded to their utmost capacity must

move in continuous procession. For the high speed passenger trains the utmost efficiency must be sought regardless of expense. For the freight traffic the utmost economy will be required, economy as to the combustion of fuel, the utilization of steam at higher pressures than we have yet considered, the employment of heavier engines and the determination of the most economical rate of speed at which this endless procession of freight trains should move, say from Chicago to New York, without stopping except for fuel. To do this is entirely practicable with our present stock of knowledge. It is not a question of science but of finance. But when this has been accomplished and the competitive traffic of large volume is handled over these new trunk lines at a cost per ton mile which cannot be approached over the roads of antiquated construction, with grades that cannot be reduced, and curves that cannot be eased, what will be the result? The fierce struggle to give the most for the least money, which is characteristic of our traffic management, will be maintained with renewed vigor.

There was a time when the difference between the rate per ton mile and the cost per ton mile yielded a margin sufficient to pay a fair return upon the capital invested, and still leave a surplus for extensive improvements. But that time has passed with most railroad companies. A few are so favored by natural conditions that such a course is still practicable for them. The traffic of other roads yields still sufficient revenue to justify the assurance that additional capital may yet be employed at a fair return of interest. But the proportion of mileage in this country is rapidly increasing which can barely spare enough from its income to pay a scant dividend to its stockholders, after paying its fixed charges. Railroad corporations so restricted in income cannot, with safety, borrow additional capital for works which will not add new business, but will simply provide better and safer facilities for doing that which they now have. If they attempt it they will use the

income applicable for dividends to pay the interest on their new issues of bonds. It is needless in this connection to refer to roads which barely pay their fixed charges. The force of this argument is illustrated by the statement that in 1891 less than one-fourth of the railroad stock in this country received as much as 5 per cent. and about 60 per cent. received nothing.

As the margin between the rate for transportation and the cost of transportation approaches the vanishing point, the most serious problem with our successors on such railroads will be how to make both ends meet.

In looking over the different departments of operation, it would seem that there is no great field for economy in the roadway department except in the preservation of timber, or in the locomotive department, except in the better combustion of fuel and the use of steam at higher pressure, unless electric motors shall yield results not yet apparent. The use of structural steel in rolling stock should cheapen the cost of maintenance in this department, but beyond these items there is no word of promise to the railroad manager for important savings in track or equipment. The direction in which there is most to be looked for is in the better use of freight cars. When we think that the average mileage of our freight cars is but little over 20 miles per day and their average load less than three tons, of what use to talk about freight train speeds of 20 miles per hour, and of freight cars of 30 tons capacity? That our stock of a million freight cars should average no more miles in a day than a freight train can run in an hour, and that too, loaded to only one-tenth of their capacity, is not creditable to our transportation and traffic officials. There is no problem before them of a more pressing character and the means for its solution are in their own hands.

There is yet another problem which in the past decade has loomed up before us and which involves considerations outside the sphere of either science or finance. It is the

proper attitude of railroad corporations toward labor organizations. This is but one of the manifold aspects of the great problem of modern civilization, the relation of capital and labor.

The problem as affecting railroad operations is still further complicated by the intervention of a public interest to be respected, which is not involved in ordinary industrial enterprises. The subject is one which cannot be satisfactorily treated within the limit of time now at my disposal and I have only referred to it in this incidental way as one of those problems as yet unsolved. That the solution, when reached, will tend to improve the present relations between officials and other classes of employees, we who are now of the one class and have been of the others must not only hope but believe. We represent the minds which control this army of three quarters of a million of men and we must not lose sight of our responsibility to them, to the nine thousand millions of capital invested in the enterprises placed under our management and to the sixty-five millions of citizens whose lives and property are entrusted to our care. We are here in the midst of a display of the world's development in every department of nature, organic and inorganic, in every phase of human progress from primitive savagery to the latest results of modern civilization ; a display as enormous as it is magnificent. So enormous indeed, so complete in its fullness of presentation, so inimitable in its artistic setting, that mankind in despair of rivalling it may never seek to reproduce it. And in this stupendous array of that which the will of God has created and the hand of man has wrought there is no one department that sets forth the continuous advance of humanity along the lines of progress and civilization so forcibly as that which finds its most triumphal expression in the appliances for accelerated transportation. As we gaze along these rows of locomotives from the pigmies of 60 years ago to the behemoths of to-day let not the present generation forget

the great debt which it owes to the stalwart champions who entered their iron steeds in the locomotive tournament that preceded the opening of the Liverpool & Manchester Railroad, and let us all who are railroad men here on this occasion glory in their great achievements and feel proud that it has fallen to us to carry on the work so bravely begun by them.

## A RAILROAD MAN : HIS TRAINING AND CAREER.

(Address Delivered at the Anniversary Meeting of the Railroad Branch, Young Men's Christian Association, New York City, January 30, 1894.)

That I, a stranger to most of you, should have been invited to address you on this occasion was indeed a surprise, but also a pleasure, since it affords me, a railroad man, the opportunity to address an assemblage of railroad men.

It would seem that from the experience of one who began life as a rodman in a railroad engineers' camp and who has served as an apprentice in a machine shop, as a locomotive runner, as an engineer on construction, as a superintendent in operation and as general manager and as vice-president in the management of a railway system, I say it would seem that from such an experience of forty years something could be gathered which the older men among you might recognize as familiar to them, and which should be of interest, and perhaps of profit, to those whose experience is yet to be acquired.

That period of forty years covered great changes in the manner of operating railroads. What was then but an art, imperfectly understood, applied to roads of short mileage and serving only local interests, has grown into the science of railroad management applied to systems with thousands of miles of track and serving over sixty millions of people, and among them all there is no more striking example of this expansion than is afforded by the great New York Central System, which has been the means of bringing us together here to-night.

This whole subject of the history of railroads in this country, of their marvelous growth, of their importance to the welfare of our people, of their future development, is one of surpassing interest in whatever way it is

viewed, but for your purposes and for mine it is best to look at it as it affects the railroad employees—the men who build railroads, who keep them up, who handle the trains and the traffic and the accounts. How is it with them? Has their condition improved with the growth of railroads? Is their chance of getting along in the world as good now as it was with those who went before them or with those who are following other occupations?

For, after all, the matters of most importance to nearly every man are to make a living for himself and family and to better his condition and theirs. These are practical questions, and if I am to talk to you about them at all I must do so in a practical way. I do not propose to preach to you, nor to deliver a lecture on morals, but to see if there has been anything in my experience as a railroad man which can be applied to your case and which may help you to do some of your own thinking.

The first railroad men that I knew had generally started out in life in some other business. They had been mechanics or laborers on construction who staid on after the road was built, and were employed on work trains or around the shops, and then got on the road as firemen or brakemen or perhaps as track foremen. The locomotive runners were mostly mechanics who had been sent out to put up the engines from the shops where they were built. Where the railroads had done away with stage lines, the stage drivers were frequently hired as conductors. From this way of employing men it followed that many of them had to learn the business after they had taken it up, and they did a good deal of experimenting as they went along. The discipline was loose and the rules were few. On the older roads the men knew the people along the line as well as they knew the grades and curves, and they had their own understandings among themselves about making passing points when trains were out of time, and about many other things that are now provided for by rules. They got along with what we would now consider poor appliances,



with results, that as I look back upon those times, seem very remarkable. They were men full of resources in emergencies. Whether an engine broke down or a train got off the track, they had to take care of themselves, for there were no telegraph lines, and wrecking trains with their tools and appliances were unknown. Whatever was done had to be done with jack-screws and pry-poles and engine wood, or with such material as could be picked up along the line of road.

Then there came a time of rapid expansion when many roads were built and railroad men of all kinds were in demand. The younger men on the old roads went to the new roads to better their fortunes, which the steady men generally did. But along with this class of men went another class who were no credit to themselves nor to any one else,—men who had been dismissed for bad conduct or for worthlessness. Such men gave railroad men a bad name in communities where railroads were a new thing, and it was not surprising that the old settlers did not want to associate with them and did not attempt to discriminate between the good and the bad. This led to the railroad men flocking by themselves, and where a set of men, all engaged in the same business, are thrown by themselves, they not only became very clannish, but if many of them are young and without families it is neither conducive to good habits nor to good behavior.

When the railroad mileage of this country was increasing from six to ten thousand miles per annum, there must have been also a yearly increase of from 30,000 to 50,000 railroad men, and it was very easy to get employment on a railroad. It also afforded an excellent opportunity for men of experience and ability to obtain promotion. For some years past construction has not been so great, and now it has measurably ceased. Whether we shall soon see a return of what we may call the flush times of railroad building is doubtful. There hardly seems room for many new systems built a thousand miles at a time as has been

the case heretofore. Nearly all the construction at present is in the way of local feeders to existing systems and which come under their management. With this situation before us we look around and ask, what is the prospect for a railroad man to make a living for himself and his family? What is his chance for bettering his condition?

As I have just said, circumstances have somewhat divided railroad men into two classes. One includes the men who have held steady jobs for years, who have raised their families in one place, and are not only part and parcel of the communities in which they live, but, as one may say, part and parcel also of the roads on which they are employed. It is this class of men that has made railroad-ing in America what it is to-day. From this body has sprung the staff of officials which, on our older roads, has worked out the art of transportation into a science; and there is a community of feeling between such officers and such men, a sentiment of mutual respect, and I will add of my own knowledge, of personal regard and affection which can only be paralleled by the comradeship among old soldiers. Indeed, it arises from the same kind of association in hours of fatigue, of anxiety, of peril, which makes men know each other better than they would in years of ordinary business intercourse. This is the sort of experience which I know many of you have been through who are here to-night, and as you look around this room you can recognize just such men of your own acquaintance, tried men and true, men who would be found dead doing their duty. They are the backbone of your railroad service, they do honor to the name of railroad men and they are the ones whom you should ever keep before your minds as examples to follow, you young men whose characters are yet to be formed and whose reputations are yet to be made.

There is another class of railroad men of whom I must speak in different terms; adventurous and restless of mind, ever ready to roam from place to place, impatient of re-

proof and of control. Men of this disposition in the past found employment on newly constructed roads, often in such numbers as to lower the standard of efficiency and by their carelessness and recklessness to bring the name of railroad men into reproach. Such men are bad examples to follow, yet by reason of their self-assertion and of their readiness to appeal to the passions and prejudices of their associates they often exert a more powerful influence over their younger companions than is obtained by the solid and worthy men who go quietly along about their business and have but little to say.

Against men of this class I would put you young men on your guard. It may seem well enough to you at the time, when you have some grievance either fancied or real, for such a man to advise you to get even with the official who has given you offense, but he appeals to your temper and not to your judgment. He is playing the devil's part, inciting you to unkind feeling and perhaps to evil doing, not that you may be bettered but that you may become like unto himself. Well do the Scriptures say that evil communications corrupt good manners. They corrupt the course of your habits and thoughts and acts at the very sources whence they spring in your own minds. A man is within himself just what he makes himself, but unfortunately many of us only find this out after we have become so set in our feelings and in our prejudices that it is too late to change very much for the better.

I say to you, from my own experience, that while you are young you should endeavor to feel kindly towards those who are around you and over you. Make allowances for their shortcomings when, under momentary irritation, they speak harshly to you or do something which you feel is unjust and you will find that the effort to control your speech and your thoughts will often serve you in good stead and be of increasing value to you as you grow older. I have known what it was myself to be treated harshly and unjustly by my superiors, and have had reason

to regret that I had not then some one to give the advice which I now give to you. No good comes of airing your views when you think that you have been badly treated ; your violent language may amuse those who hear it or be carried by tale-bearers where it will be used to your detriment. Keep your feelings to yourself. Wait until you have cooled down, then think over what happened and see whether you were not in some way to blame or seemed to be so. In a short time the matter will have passed out of your mind, or at least have lost much of its importance and you will, perhaps, have saved your job. Above all you will have acquired that habit of self-control, which is at the foundation of success in life, either in the family circle or among your acquaintances and friends or in business, whether you are an employer or an employee. Look around among the older men on the road and see if the more successful among them are not remarkable for their self-control.

It is another characteristic of this class of men that they attend closely to their own business and very little to that of other people. Whatever they have to do, they do as well as they know how. They do not slight it nor attempt to get off by doing just as little as will pass muster. Next to self-control I place, as an element of success, the quality of thoroughness. If your employer finds when he puts you to do anything that he does not have to follow you up to see whether it is being done properly, he will not forget it ; nor will he forget you when he has a vacant place that requires just such a man to fill it. Do not be afraid that you will do more than is expected of you. The way to learn is to do everything that comes to hand. If a man with whom you are placed as a helper is willing for you to do your own work and his too, look upon it as a good opportunity to learn, and not as putting something on your which you will avoid, if possible. A man learns his business in two ways, by getting practice in it and by gaining information. I have just said that the way to get prac-

tice is by doing anything that comes to hand where you are employed. You will gain information by listening to those who have had more experience than yourself. You can learn much in a practical way from men who understand their business that you cannot obtain from books.

Not that I would have you to undervalue books. They contain all that remains of the minds of those who have gone before us, and, as time goes on, that which in any art was at first known only by those who were expert in it, becomes stored up in books. This is especially true of the arts peculiar to the operation of railroads. We are only separated by one generation from the men who built the first railroads and the first locomotives, so that the time has been rather short in which to gather much practical knowledge about railroads into books. In fact, the arts connected with railroads have developed so rapidly that much which the books do contain is already out of date. So far as your every-day work is concerned, the information of most value is found in the current periodicals.

There is yet another way in which your stock of information may be increased besides reading and listening to your elders; that is, by discussion among yourselves. There is no better way of finding out what you do not know than by endeavoring to enlighten others as to what you do know. If I wanted to advance a party of young men in the knowledge of their business, I should advise them to organize a conversation club. At each meeting a member, in turn, should read a paper on some subject connected with their business and the others should question him. The membership should not be so great as to make the proceedings formal, for many persons are shy about standing up to talk who will speak very intelligently in conversation, and it is surprising how much information can be drawn out of men who are too modest for orators.

What I have said to you so far has been with a view to your advancement in the occupation which you follow.

I have endeavored to impress upon you that with the cessation of the rapid increase of railroad mileage there is also a cessation in the demand for new men. It is no longer a question of finding men to fill the vacant places, but of places for men who are out of employment. In the struggle then for promotion he who is the best equipped will be the most successful and the winner in the contest will not be one who is ready to find fault, who is disposed to slight his work and who is least informed as to how it should be done. But I have something to say not only as to the opportunities and the requirements for promotion in railroad service, but also as to the future outlook for those so employed. It is generally assumed that railroad men receive better wages than are paid in other occupations. So long as railroad men were in demand, this might well be so ; but times are changing in this respect. Not only has the period of rapid expansion passed, but we have reached a period of depression which has seriously affected railroad earnings. Although over one-half of the railroad shares in this country is receiving no dividends, and less than one-sixth is receiving as much as five per cent., those who are best informed think that there is worse yet to come.

Whenever the wages in any occupation, by reason of the scarcity of suitable men, rise above the average, many are eager to be so employed and the supply soon exceeds the demand. So long as that business continues to pay well on the money invested in it, employers are willing to pay the regular rates even though men are in plenty. But when profits diminish, employers try to reduce expenses. They must reduce them within their earnings or fail in business themselves. This is about what is taking place on railroads. When the first roads were built they were hailed as a great public benefit. Everybody did well by reason of the railroads and no one begrudged the stockholders their dividends. But just as it is with men rushing into occupations which pay well, so it was with railroad

building. The business was overdone, competition followed and rates were cut, but not enough to suit the farmers, who saw the prices of their products going down, nor the manufacturers, who were trying to undersell each other. So there has been a constant effort to force down rates, either by the railroad companies competing among themselves or by their customers where there was no railroad competition.

It is this which has led to so much legislation against railroads and which has made it so easy for politicians to get office by abuse of them. It is the old story over again of the goose that laid the golden eggs, though the eggs laid by the railroad goose have not all gone to the public and to the stockholders. A good part of them has gone to the employees. It is stated that for every dollar paid in dividends four dollars go to them. I mention this only to show how closely identified are the interests of the railroad man and the company which employs him ; that any change in the future which is bad for the company will be bad for him, and that the prospect for neither is very encouraging. It follows that the questions which are being agitated all over the land about railroad rates and laws affecting them, are of great moment to those whose daily bread is earned on railroads, and railroad men should therefore take an interest in them and try to have an intelligent understanding of them. For, happily for yourselves, you live in a country where one man's vote in the ballot box is as good as another's, and if others seek in that way to have their interests cared for, it is your right to do likewise.

And this brings to the front another view of the present situation which I would impress upon you, you who are American citizens and who enjoy greater privileges and live in greater comfort than any people in any other country or in any other age. This is partly due to the wisdom and the virtue of those illustrious men who laid the foundations of our liberties and whose names and

deeds should ever be held in grateful remembrance by us, who now are enjoying the fruits of their labors. It is also partly due to our wonderful resources of soil and climate. This combination of men and means has made our country great. It has attracted millions of men across the seas with strong arms and stout hearts, who have cleared the forests and sowed the fields and built the roads and opened the mines and wrought in shops and factories, until now we have attained the foremost place among the nations for wealth and population. Within a century all this has been accomplished from humble beginnings, not only as to means but as to men. There was no accumulation of capital to begin with and the work was not done by high born gentlemen. The beginnings were made by men whose early training had taught them industry and economy, and who, by practicing those homely virtues, were enabled to avail themselves of the opportunities which offered for the investment of their savings as the resources of our country were being so rapidly developed.

This stage in our history has passed away. The public domain has been divided. The vast forests are disappearing. Great cities no longer spring up, as it were, in a night. The wonderful deposits of gold and silver, of coal and iron, of petroleum and natural gas, seem all to have been discovered. The pursuit of wealth is no longer a lottery. The prizes have all been drawn and the coming generation must settle down to earn a living somewhat as their European cousins do. The lavish display, the wastefulness, the contemptuous disregard of small economies characteristic of our people can not be much longer persisted in without lessening the comfort in which they live. For the increase in our population is gaining on our resources, and as the one nears the other it will be harder to maintain the present average income of each family. Already the farmers have felt it; it is coming closer to the laboring man, to the mechanic and to the clerk, and the railroad man will feel it too.



And here is where I think that the railroad man is the more fortunate, inasmuch as he is surer of steady employment. In the fluctuations that take place in other occupations, shops and factories are liable to be shut down, goods of different kinds become unfashionable and their manufacture ceases to be profitable, but so long as men travel and freight is shipped so long will the railroad companies need every steady man in their service. The experience which they have acquired, their knowledge of the little details which makes the work go along all right, their familiarity with the conditions under which that work is done, all make these men of such value that they will be parted with reluctantly. We see this exemplified in the confusion and disorder that prevails when there is a strike and the work is done by strangers, as also in the rapidity with which everything gets to working smoothly when the strike is off and the old men are back in their places.

It is this which assures to the railroad man greater security for steady employment than in other occupations. He does not have to be taught. He knows his business and his employers recognize it. He has all the value that a drilled man, a veteran soldier, has in the army. Indeed, the men in railroad service constitute a great industrial army, and as much of the organization of an army has been unconsciously adapted to the necessities of railroad operations, in time some plan will be worked out for ensuring steady employment and for caring for the faithful, worn-out veteran in railroad life as in military life. If faithful service justifies such care and consideration in the one case, it certainly does in the other.

And now while wages are good and you have steady employment is the time to practice thrift, to observe those precepts which have perpetuated the memory of Franklin and which, at last, lie at the bottom of the prosperity of every country. For a nation of paupers is a pauper nation. What a people should first economize in is its so-

called pleasures. I say so-called as distinguished from those which are pleasures indeed—the pleasures of home and of neighborly association ; the pleasure of doing good to others and of improving one's mind. But the trifling amusements and habits which take time and money and leave behind either nothing or that which is injurious ! I do not intend to be personal, but how many of your acquaintances can take to themselves the fable of the grasshopper and the ant ? How many that could not live upon their own resources even for one month if out of employment !

The French are sometimes termed a frivolous people. They have no broad prairies waving with golden grain nor fields white with cotton ; no forests of valuable timber nor mines of precious metals nor stores of petroleum. Their primeval patrimony was wasted ages ago. Yet the enormous war indemnity of one thousand million dollars was said to have come out of the old stockings of the peasantry, and they saved enough afterward to put two hundred and sixty millions more into the Panama Canal. Why should such a people be termed frivolous ? And what an example to us who are so much more favorably situated !

I have spoken of time wasted in idle amusements. It is a waste of that which is more precious than money. If each of us had received at birth twenty-five thousand dollars to last for a lifetime of seventy years and we were to throw away one dollar each day, at the end of the seventy years we should have wasted the last dollar. Call each day of your life a dollar and you will be impressed with the value of time to each human being. If two men of equal ability and with equal opportunities work the one eight and the other ten hours a day, the latter will accomplish one-fourth more than the former. I am not advocating a life of constant toil. The ideal existence is one in which the struggle for a livelihood does not exclude recreation. But recreation is another thing than idle

amusement. Recreation means re-creation, a renewal of the stores of physical and mental vitality which have been expended in work. It includes food and rest and exercise for mind and body ; good food and undisturbed rest and agreeable exercise. These we seek either in our homes or elsewhere, and it is well for those who get the best of each. Outside of your family circle where could you find better than that which is here provided ? I was surprised, when I was shown through this building by Mr. Warburton, to see what provision had been made for that which I have just defined as recreation, that is, food and exercise for body and mind. That part which relates to the body I shall not dwell upon, but that which relates to the mind has such importance in my eyes that I must, in conclusion, say something more about it.

The mind is the immortal part of man. It lives in the Bible and in the writings of the poets and historians and philosophers whose life work graces the shelves of every library and family circle in every country which has a written language. As we read what they have written, our minds are carried away from and above the ordinary affairs of every-day life and a new existence is opened up to us ; one that we enjoy in common with those who have written and those who have read these immortal works. This is the repast that is set out before you on these library shelves, a banquet which every one can hope to share who can read the language in which they are printed. And beside this pure enjoyment, an enjoyment of which the mind never tires, there is the opportunity for improvement, for adding stores of knowledge to that which you have already acquired by experience and by observation. A wise man has said that we should know everything about something and something about everything. The something about which you should know everything is that by which you earn your bread, and that part of it which can be learned from books is here at hand, so convenient that it is your own fault if you do not seek it. You need

no great amount of learning to undertake it. If you can read and write and perform the four ground rules of arithmetic you can learn all that is necessary for a railroad man to know from a track hand to the president.

If you are in roadway service you should understand how grades and curves and earthwork are staked out, how frogs and switches are put in and curves are elevated ; something about the strains in a bridge and their distribution among its several members. If you are on an engine, do not let everything about it remain as a sealed book to you, except to shovel coal or pull the throttle or tell water from steam. A locomotive is one of the most ingenious machines that the mind of man has conceived or his hand has wrought, and the men who ride on it daily should not only know how to handle it, how to take it apart and put it together, but should also comprehend the principles involved in the combustion of fuel and the peculiar properties of water, its evaporation into steam, its expansion and condensation. The compound engine is likely to play an important part hereafter on railroads, and is a subject which may well demand your attention. Or if you are a mechanic, either in a car shop or a locomotive shop, whether you work in wood or metals, there is much going on around you that calls for head-work as well as hand-work, and every mechanic has in him the making of a mechanical engineer, if he will add book knowledge to his knowledge of his trade. Or if you are a train man or a yard man, your rule book is not the only book that may be of use to you. You are daily employed in connection with two devices which are all important. I speak of couplers and train brakes, and a thoughtful, observant man, situated as you are, might well work out some useful improvements of these devices. Are you a telegraph operator or signal man ? If so, then the mechanism under your touch embodies one or both of two forces which are destined to yet further and greater development, electricity and compressed air. Or if you are in the traffic depart-

ment, that network which involves in its tangled meshes the revenue which is the life blood of a railroad, you should familiarize yourself with the economic arguments which properly apply to the making of rates. If you are in any of the bureaus which constitute the general management, you are near the focus in which all information is concentrated and whence instruction is distributed, and you have before you a field for fascinating investigation into the resources and expenses of railroad operation.

So view as you may the occupations incidental to railroad service, and there are none of them in which the mind does not play a prominent part unless a man is content to be a mere cog in the wheel, an appendage to the machine which he tends. Need such be the destiny of any one in this audience? Is there any reason for lacking the knowledge required in any branch of your business; for the cultivation or rational recreation of your minds and bodies? Look around you and let this building answer and the facilities which it affords! And if experience should show that these are in any respect deficient, rest assured that the same liberal hand, the same clear head, the same sympathetic heart which have brought this Railroad Men's Building into existence and have provided for its recent enlargement will be equal to any further demands that may grow out of the general acceptance of its advantages by those for whom they are intended, by the employees of the New York Central and Hudson River Railroad Company.

## THE ROAD MASTER AND THE TRACK FOREMAN.

(Address delivered at the Annual Meeting of the Roadmasters' Association of America in Tammany Hall, September 11, 1894.)

I am here to-day to address you briefly, in response to the invitation of your President and my friend. I do so with the greater pleasure because of the honor which your Association has conferred on the railroad system which I represent in having twice selected its President and twice its Secretary from among our roadway officials.

As I look around this hall, I am reminded by the sunburnt faces and stalwart forms before me, that this is not an association of book men, that you have served an apprenticeship of exposure to the heat of summer and to the chilling blasts of winter; that through years of arduous service, by day and by night, you have, step by step, earned that promotion which has entitled you to seats in this assemblage.

The engineer and the conductor, when they have finished their daily runs, know that their work for that day is done. The office man as he rises from his desk and closes his books, thinks of them no more until the morrow. But the track foreman, the supervisor, the road master, take their responsibility home with them to their firesides, never knowing when they may be summoned to face the raging tempest or the driving snow storm to make sure that the swiftly speeding train shall safely reach its destination.

And when we think of the number of rails and ties, of angle-plates, bolts, nuts and spikes that make up even one mile of track; that a defect in any one of them may lead to serious accident and that the trackman's responsibility covers an inspection of each of these many parts

for many miles, as well as of frogs and switches, of bridges, culverts and crossings, we recognize that he must be trained not only to a close observation of details but also to an almost ceaseless vigilance. Training means discipline and in no department of railway operations is strict discipline more requisite than in roadway service. Indeed, it seems to spring spontaneously from the character of the employment, so arduous, so exacting, that the stern enforcement of duty comes to be a part, as it were, of the very nature of those who have charge of the work in that department.

A trackman's life is, to a great extent, an isolated one. From dawn to eve he plods along, remote from intercourse with the outside world and but occasionally interrupted by a passing train. Thus communing with himself and trained to habits of vigilance and observation he is, as might be expected, intensely practical; so much so, in fact, as to become a trifle dogmatic. He feels sure that his way of doing things is best, since he but seldom sees how they are done by others and he carries that feeling along with him as he advances in his line of promotion.

Hence it is that association with others of his kind is of benefit to him. For as he exchanges opinions and experiences with them, each finds that the others do some things in a better way than he has been doing them and there is an advance all along the horizon of progress.

There is another view to take of the value of your technical association, and that is of the opportunity which it affords for bringing together, face to face, those who have gained their information originally, the one by hard labor; the other, in the schools. These two are like the two knights who approached from opposite directions, the shield suspended in the road. One declared it was made of silver, the other that it was of gold. From words they got to blows, and it was only after they had clubbed each other to exhaustion that they found that each was only half right.

Here is the place for you to club each other with sound arguments and solid facts until you have reached results which both sides will accept as true. In this way you will arrive at correct conclusions upon many questions about which there are differences of opinion and you will keep in line with the march of improvement.

As occasion offers for each to see what the others are doing, you will find that, under similar conditions, you are gradually approaching uniform methods ; that is, that in your practice you are becoming more theoretical—for by theory is meant an intelligent conception of principles derived from a correct observation of facts.

There is a continual demand upon railroad managements for better service, the foundation for which is provided by the department under your charge. That which answered for light engines at low speeds will not serve for the monsters of to-day, rushing through space with their long trains behind them. The random, slipshod ways of former years are being replaced by more precise methods, and he who does not keep in touch with those ahead of him, will surely be left by the wayside.

If you bear this in mind in your Association you will investigate every feature of roadway practice, gathering facts for your discussions and in your discussions, throwing light on the dark places. In doing this, there is one feature of growing importance to which I would direct your attention, that of block signals and interlocking switches. This subject has attained far greater development in Europe than in this country. But as our traffic increases and our trains are more frequent, as our passenger stations and freight yards are enlarged, the necessity becomes the greater for adopting these improvements. But the system as developed in Europe, where the roads are mostly double tracked, the permanent way expensively constructed and labor cheap, must be greatly modified to suit this country where perhaps not ten per cent. of the mileage is double track and labor is much better paid.



And now, gentlemen, if I have not been quite as brief as I led you to expect, it is because of my interest in the matters which you have in hand ; an interest so great that I can hardly refrain from enlarging yet further upon them and upon your responsibility with respect to them. I know that you feel that your efforts are inadequately appreciated by those who have not had the training that you and I have had.

Still you should continue to press onward and upward in the career that you have chosen, contented for the present with the consciousness of duty well performed, trusting that in due time the value of your work will be more generally recognized.

In this connection you cannot overrate the advantage to you of membership in the Roadmasters' Association of America so long as each and every one of you does his part to make it a success.

## ADDRESS AT THE ANNUAL DINNER OF THE WESTERN RAILWAY CLUB.

(Chicago, Ill., Tuesday, September 17, 1895.)

I have come 1,000 miles to be with you here to-night, more from my desire to meet the gentlemen who have made the Western Railway Club a success than with the idea that what I may have to say about the International Railway Congress is worth coming so far to tell ; but be that as it may, time is flying and I will not waste it with much of a preamble.

The International Railway Congress was organized about ten years ago by the railway administrations of Continental Europe. Its meetings have been held two or three years apart at Brussels, Milan, in Paris, during the exposition of 1890, and in 1892 at St. Petersburg. As the state railway administrations are members, its meetings have received marked recognition from the governments of the different countries in which they have been held, and when it was determined to hold the meeting this year in London, the British government joined with the railway managements to make the occasion a notable success.

The permanent administration is established in Brussels, though the members of the International Commission are selected from the different countries which are represented in the congress. This commission prepares a program of questions to be considered at each meeting, sometimes in advance of the date at which the meeting is held. Each subject is assigned to a competent person to obtain the information concerning it from the members, and to put the same in proper form for distribution in advance of the meetings. For the discussion of these papers the members

at the meeting are divided into sections on permanent way, equipment, train and station service, etc.

The official language of the congress is French, though it is permitted to use the language of the country in which the meeting is held. Whatever is said in either language is briefly translated into the other by official interpreters. These discussions duly edited in connection with the papers which led to them, appear in the proceedings, which are also published in the two languages, and generally amount to three or four ponderous quartos. So much for the organization of the congress.

Before the recent meeting but little interest had been taken in it by American railroad officials. Mr. Ely of the Pennsylvania Railroad and a few others had attended some of the previous meetings, and when it was decided to meet this year in London they aroused sufficient interest among some other companies to induce them also to become members and to pave the way for the American Railway Association to be represented by its president, secretary and six other delegates, including Mr. Harahan of the Illinois Central road, and Mr. Frey of the Atchison road.

So on the 12th of June a party of seventeen started from New York. As but few of us had crossed the ocean before we were rather a fresh lot, with much to learn, and as we found out later, with some things to unlearn. On our arrival at Southampton we got an intimation of what awaited us in the way of hospitality both from the government and from the railway officials, when we found our baggage passed through the custom house without examination and a special train ready to take us to London.

It was with curious eyes that we viewed for the first time their toy-like engines and cars, or, I should say, carriages and wagons, but their massive station buildings, retaining walls, and bridges along the line well deserved the name of permanent way.

And so we sped on through green fields and past thatched cottages and trim hedges and flocks of black-

nosed sheep that are characteristic of Southern England, and into the very heart of London before we stopped.

The next day we rigged ourselves out in high silk hats and long-tailed frock coats that we might be in the prevailing style, for it is a fact that every true Briton arrays himself in this panoply while in London, and nowhere else.

I wish that I could dwell upon the impressions made upon my mind during my month's stay in this metropolis of the world. And well may it be so called, for you will see there in the vicinity of the Bank of London other institutions, such as the Bank of Yokohama, of Singapore, of Australia, of the Argentine Republic, etc., representing financial relations with all parts of the world, and I was told that there were then on deposit there over \$2,000,000,000, the surplus income of British capitalists awaiting profitable investment. It made my mouth water to think of what could be accomplished with such a fund in our country. But no ! for the moment, South Africa, with its gold and diamond mines, attracts their attention, to the exclusion of less brilliant investments.

The sessions of the congress were held in the Imperial Institute, where our little band of twenty to thirty Americans was lost in an assemblage of 700 or more Frenchmen, Belgians, Italians, Austrians and Russians, with a few Germans and an occasional Spaniard, Portuguese, Japanese and Turks.

But there was a sufficient number of stalwart, cheery Britons to make us feel at home, and their hospitality was as hearty as it was magnificent. We were provided with credentials which opened to us the doors of every railroad office, signal station and shop, and which also served as passes for ourselves and families throughout Great Britain (including the underground railways in London) and over most of Europe.

It was considered a distinguished honor that the meeting was inaugurated with an address of welcome by the

Prince of Wales, and then followed a reception by the Board of Trade at the Foreign Office, with a series of banquets, parties and excursions, which gave the delegates the opportunity for an insight into the social life of Great Britain and for hasty observation throughout the length and breadth of the land, that has fallen to the lot of but few visitors there in the same space of time. As one bit of our experience I will mention a garden party given at Windsor Castle by the express command of the Queen, at which were presented to Her Majesty delegates from the several countries represented at the congress.

These recreations were intermingled with the work of the congress. Of the value of that work to Americans I can only give my own impressions. The European railway system, in its methods and in the apparatus which it employs, is so dissimilar to ours that a discussion of its details is of but little interest to American railroad men, and that little was rendered less because the most part of the debate was carried on in an unfamiliar language. As a consequence the American delegates were there as lookers-on and took but little part in the proceedings; though, when those proceedings are published I know that they will be of value to those who are interested in the details of European railway operations.

But there is one point upon which I wish to lay particular stress, and that is the evident lack of appreciation among European railway officials of the merits of American methods. This was brought out forcibly in the discussions in the section termed light railways.

They feel over there that even in those thickly populated countries there are still extensive areas insufficiently provided with railroad facilities because the present traffic will not justify the cost of construction and operation in accordance with their recognized standards, and it was evident that those interested looked to the congress for an expression of opinion as to the feasibility of relaxing those restrictions for the encouragement of such projects.

Here seemed to be the opportunity for the application of American experience. Yet, while the information offered by the American delegates was received with respect, it made no impression as bearing on their own necessities.

This was the great lesson that we learned by our presence at the congress, that the majority of the influential railroad engineers and managers of Europe are not favorably impressed with American practice. They recognize that a few of our trunk lines have approached the perfection which they have attained in Europe, but as to nine-tenths of our mileage, they look upon it as what they term "light railways," hardly suitable for feeders for their principal lines.

Now, is there not food for thought in this statement? Is there not among European railroad experts a field for some missionary work in behalf of the American system? I may be answered that it is no concern of ours to enlighten our European cousins as to how they should construct and manage their railroads.

But there is another view to be taken of this matter; one which is of great importance to American engineers, to American manufacturers of railway material and to holders of American railway securities, and to which I call your serious attention.

Within the past thirty years there have been more miles of railway built in this country than the total mileage of Europe to-day. With the aid afforded by that mileage the population of our country has, in the meantime, nearly doubled and its exports have trebled. Yet all this has been accomplished by methods which, in the eyes of European railway managers, are substantially inadmissible, even with feeders for their main lines.

Before I attended the London meeting I might have thought that while this was rather mortifying to our pride, yet it was a matter of no great interest to us. But I do not now. It is not enough for us to say, let the Europeans

manage their railroads in their way and we will manage ours in our way. It might be, if there were no roads to be built anywhere else, but the blessings of civilization are yet to be spread over two-thirds of the globe, and on what systems shall the railways be built that are to carry them? The European system is intended to provide improved facilities for existing traffic; the American system to provide facilities for creating the traffic itself; and this is the work that is to be done in South America, Africa, Asia and Australia, while the money to do it with is to be provided from the surplus funds lying idle in London and in the other great money centers of Europe. Wherever this work is done on the European system, American methods, American railroad men and American railway materials are barred. Is it then of no concern to us to enlighten our European professional brethren as to what the American railway system really is—of its greater adaptability to the needs of a new country than that with which they are familiar? And how can this be better done than by inviting them to come here and see for themselves the great work that the American system has accomplished?

The next regular meeting of the International Railway Congress is to be held in Paris during the exposition of 1900, but from our conversation with the delegates at the London meeting, I think it probable that if an invitation were extended to the permanent administration to hold a special meeting here in advance of that meeting, it would be favorably entertained. The work of such a meeting should be confined to the study of American practice, and I feel sure that there would be a good attendance of those prominently identified with railway construction in the regions to which I have referred. This is especially true of the Russians whom I met, who were desirous that such a meeting should be held in this country.

It is unnecessary for me to enlarge upon the value to our railroad men and manufacturers of railway material of bringing these gentlemen here to see for themselves

that our methods are not only suited to the needs of a new country, but also to the growing necessities of a prosperous people and to see their results in the creation of trunk lines which will compare favorably in condition and efficiency with any European lines.

If the European delegates to such a meeting could be convinced of the truth of these assertions and would give them their official endorsement, it would go a long way not only to remove the opposition to the introduction of American methods into South America, Africa, Asia and Australia, but also to remove, in a great degree, the doubts which prevail in the minds of European capitalists as to the intrinsic value of American railroad property.

This then is the great lesson to be drawn from the London meeting of the International Railway Congress: that it is of importance to American railroad men and manufacturers of railway material, as well as to the holders of American railway securities, that the European mind should be enlightened as to American railway practice and its suitability for opening up the vast regions to which European capital is now being attracted, and that this should be done by holding a meeting of the International Railway Congress within the next two or three years in advance of the Paris meeting of 1900. For the information which would be gathered by the European delegates at the meeting here would be applied by them in the interim, and the results of their experience would be duly set forth in the official proceedings of the Paris meeting, thus bringing the matter before the European world in a most impressive and convincing way.

And where could we look for the initiation of such a meeting with greater confidence than to Chicago—the greatest railroad center in the world—the city to which our nation is indebted for the inauguration and the successful conduct of the most wonderful exposition ever seen, which gave to foreign countries their first adequate



conception of our resources and of what we had accomplished with them.

And, as I speak, the memory of that grand transportation building rises in my mind, and I see there gathered together the instruments of transportation from all over the world arranged with due regard to the development of that great function of society which has given to modern civilization its greatest impetus.

It is then but natural that we should look to your city for the initiation of the next step onward in the development of this transportation problem by inviting an examination of the solution which American ingenuity and American enterprise have to offer to the nations of the world, and if the Western Railway Club, which is the representative association of the railroad officials of this great railroad center, will but favorably consider these suggestions, both you and I will find that the 1,000-miles journey which I have taken to lay this matter here before you to-night has not been made in vain.

ADDRESS DELIVERED AT THE THIRTIETH ANNUAL CONVENTION OF THE MASTER CAR BUILDERS' ASSOCIATION.

(Saratoga, N. Y., June 17, 1896.)

It is an honor to be requested to address the Master Car Builders' Association—one which I appreciated when your President invited me to do so at your last meeting, and which I doubly appreciated when the invitation was renewed for this present occasion. For your Association shares with the Master Mechanics' Association the distinction of being pioneers in organizing the technical staff of the railroads of this country for the interchange of information and for the diffusion of knowledge as to better methods and improved appliances.

The success which has attended your efforts has incited officials in other departments to organize for similar purposes, and pointed out the way to the formation of the American Railway Association, whose object is defined in its Rules of Order as "the development and solution of problems connected with railroad management in the mutual interest of the railroad companies of America."

In the department of railroad operation to which its members belong, that has been likewise the object of your Association, and the conclusions which it has reached as to certain details in freight car construction have not only been accepted by the American Railway Association, but have also been embodied by the United States Congress in the Railway Safety Appliance Act.

The good work which our Master Car Builders have accomplished in the attainment of better methods and of improved appliances in car construction is well understood by those who, like myself, began a railroad life at

an early age, and have since been closely connected with the management of railroads in this country. As our minds revert to the past, how vividly we recall the humble, low-roofed cabooses which once served as passenger cars for the same class of travel that now obtains the most luxurious accommodation. For cabooses they were indeed, with but scanty provision for comfort. But, whether for day or for night travel, that was all that was afforded to the passengers who emerged from a train of such cars as weary and dirty as any tramp that you may meet along the highway.

By degrees the passenger car became less and less like a box car. It was lengthened and heightened; the deck roof improved its appearance and ventilation; conveniences of different kinds were added; but the great step forward was taken when provision was made for sleep in a recumbent position while traveling.

The traveler of to-day may well be grateful to Mr. Pullman for the manner in which this idea has been developed by him and by his imitators, but the men who first recognized the claim of a human being to stretch out his cramped up limbs in a railroad train, even though it was only upon a hard plank, was the Columbus who discovered the sleeping car. If he be unknown at present, the Master Car Builders' Association ought to appoint a committee to discover him, and should then devote an entire page in its records to transmit his name to future generations.

The appliances for safety have kept pace with the appliances for comfort. One of the earliest that occurs to my mind was the ceiling of the under side of the floor joists; an improvement forcibly impressed upon one who has participated in the derailment of an old-time passenger car, when the car body was snatched from the trucks and skidded along the rails, tearing out the floor joists as it went. Then, what an advance has been made from the old four-wheel truck mounted on journal springs,

without equalizers or bolster springs. How many devices in the way of springs were tried, condemned, and scattered along the road of improvement which led up to the six-wheel truck of to-day. Wagon springs and carriage springs ; gum springs, some of elastic rubber and others made mostly of whiting ; steel springs, half-elliptic and double-elliptic, duplex, triplex and quadruplex ; spiral and helix ; and some made of coiled wire, stuffed with wool and packed in cases ; and the so-called air springs, cylinders, like diving bells, floating in receptacles filled with molasses, which gradually became solidified by the dust gathered up along the track.

And think of the advance from the hand-brake on a single truck up to the quick-acting air-brake of to-day—a march of improvement with which the name of Westinghouse is as inseparably associated as is the name of Pullman with the development of the sleeping car. Nor can the advances made in the line of frame construction be ignored, even in this rapid glance backward. For the car body, which was at first little more than a weather shelter over a platform or floor, has become a structure in which the materials are ingeniously disposed to offer the maximum resistance to tensile and compressive strains.

But the Master Car Builder of to-day is not only an engineer, a man versed in structural strains and in devices to resist them. His construction must not only conform to the laws of mechanics. He is also an architect. The structures which he rears, although they be on wheels, are becoming rolling palaces indeed, in which those architectural principles must be regarded which have been held as true from the time of the construction of the Egyptian pyramids and of Solomon's temple, of the Athenian Parthenon and mediæval cathedrals, down to the present day of twenty story sky-scrapers.

Nor is this all. He must not only be an engineer and an architect ; he must not only furnish palaces on wheels for modern travelers. He must so decorate his structures

as not to offend their highly cultivated natures. He must, therefore, be an artist besides. To satisfy their æsthetic cravings he must ransack the resources of decorative art ; mahogany, rosewood, satinwood, ebony and ivory ; marquetry, mirrors and gilding ; silks and satins, brocade and plush of every varying hue ; all so deftly arranged and draped as to be in accord with the prevailing fashions.

It is, then, the work of the Master Car Builders which most impresses the traveler by rail. Little does he know or care about the labor and thought expended on the road-bed over which he luxuriously glides ; or of the bridges and tunnels, masterpieces of engineering, which bear him almost in the twinkling of an eye across mighty rivers or through the bowels of lofty mountains. As he lolls in his chariot of ease, he may bestow a passing glance upon one of those huge Titans of steel, devouring coal and snorting smoke from its nostrils, as it speeds along its way, but of the ever-watchful care of the train despatcher and the signal man he is as unconscious as of the will of Divine Providence. For even the safety of the traveler concerns him less than that he should be commodiously entertained as he journeys along. With this demand the Master Car Builders of to-day have complied with such earnestness that the American traveling public is housed as princes never were before. So they must have, not only cushioned seats, comfortable beds and toilet accommodations with hot and cold water always turned on, but dining halls as well, and observation cars, libraries, bath-rooms, a barber-shop, and even a typewriter must be at hand. To what greater length are you Master Car Builders going in your efforts to pamper and spoil the American people ?

Why, even the ladies who are here with us to-day and who, of course, highly appreciate what their fathers and husbands have done in beautifying and glorifying the American passenger car, know and care but little about the success which they have attained in a matter of far more

importance to the railroad companies—the construction of a freight car.

Just as you have developed the American passenger car from what I have styled cabooses, so you have wrought out the American freight car from what I will style a wagon truck. Let us look back again and recall the little box car of six to ten thousand pounds capacity, and compare it with the modern freight car of sixty thousand pounds capacity, framed to resist a variety of strains and shocks to which no other structure on earth is exposed.

In the contest between the standard gauge and the narrow gauge, in which we were all intensely interested some twenty years ago, the promoters of the narrow gauge idea were never tired of expatiating upon the advantage which it afforded of a greater weight of paying freight in proportion to the weight of the equipment. It is true that they claimed also a saving in the cost of road construction, but this was their principal argument; that the cost of transportation per ton-mile would be greatly diminished upon a narrow gauge road by this reduction in dead weight, and they thus induced a useless expenditure of millions of dollars in the construction of thousands of miles of narrow gauge road in this country—nearly all of which has since been changed to standard gauge. And why has it been changed? Simply because the Master Car Builders have been steadily reducing the proportion of dead weight on the standard gauge, until now they have produced a car which will carry sixty thousand pounds and more of load on less than thirty thousand pounds dead weight.

But we must not look altogether to the past for your victories. For you have to win still further triumphs in this direction. While, in the construction of passenger cars, it would be idle to offer any suggestions as to increasing the comfort or the safety of your passengers—unless it be to improve the light and ventilation—it does seem that in the attainment of these ends you have not sufficiently regarded the matter of dead weight. For, with the

demand for higher speed, the weight of trains becomes a factor of increasing importance. The express locomotives of latest design can maintain a speed of sixty miles per hour over roads of average grade and alignment with a train of five cars, weighing in all, say two hundred tons, but this is about the limit of efficiency at that speed. The grade and alignment of track are, of course, virtually unchangeable. The steaming capacity of the locomotive is limited by the possible heating surface and grate area, and these, again, are restricted by the width of gauge and necessary clearance. So that to maintain a higher rate of speed either the weight of the train must be further restricted, or recourse be had to the questionable expedient of double header passenger trains.

As soon as a high speed train is established the officials in the passenger department appeal for additional accommodations upon it. They want, if possible, a sleeping car direct to each point of competition. Can you not to some extent respond to this appeal by furnishing a train of six cars that will weigh no more than the present five-car train, and yet preserve the same relative seating capacity and retain the same conveniences for passengers? Is there not here a lesson to be learned from the evolution of the bicycle?

In the construction of freight cars you will have this same question to meet as to relative weight of trains to speed. The practice is becoming common of rating freight engines by the weight of train, rather than by the number of cars, and whenever the freight rates of this country are recognized as fixed beyond the possibility of disturbance by rebates and other illegitimate concessions, the favor of shippers will be solicited by offers of speedier and more frequent deliveries. Both of these considerations will increase the demand for lighter and stronger freight cars.

Whenever I have had to place a contract for freight equipment I have been impressed with the value of minute

and accurate plans, specifications and bills of material. It is here that a dollar counts one way or the other. For, in a contract for one thousand cars, the omission of a dollar's worth of material or labor upon each car means a thousand dollars clear profit to the contractor. This fact also emphasizes the necessity for thorough, continuous and intelligent inspection, when cars are built by contract. The establishment by this Association of a standard axle and journal box has been a great economy to railroad companies, and it is much to be desired that it should reach a similar conclusion as to other details of freight car construction; as, for instance, a standard body bolster for sixty thousand pound cars, that will retain its rigidity under hard service.

I might continue to mention, as they occur to me, other features in your department which invite consideration, but I must not forget that this address is but an incident in the programme with which you must concern yourselves at this meeting.

Have you ever reflected upon the effect which the use of the four-wheel truck on American railroads has had upon the social life of our people? Any one of you who has traveled upon an English railway train must have felt the difference in being caged in a compartment with six or eight people, and in having a free run through one of our trains, from the smoker to the observation car. This difference is fundamentally due to the evolution of an English railway carriage from a stage-coach. Indeed, it is not so much an evolution from a stage-coach as the fastening of two or more stage-coaches together, back to back. In keeping the carriages separate, the company has been separated also, the sheep from the goats; and the classification originating when there was a strong social reason for it, in the days when the gentry traveled in their own carriages, the business men in stage-coaches and the common folk in wagons, has been maintained on the railways, after the social necessity for it has been greatly lessened.



Now, if the "bogie" or four-wheel truck had been adapted in England to railway equipment, the result there would doubtless have been somewhat as in this country, that is, longer cars, with end doors and communication through the train. Hence we have people moving from car to car, seeing who is on board, meeting friends, making acquaintances and maintaining a circulation of ideas and of information that assists in keeping the whole train-load of passengers, of all sorts and kinds, from stagnating and separating into strata of different social elements. The train conductor has, in the same way, been brought into social contact with his passengers, thereby becoming an official to whom they look for direction and advice, instead of a guard to be tipped with a sixpence.

The use of the pivoted truck has also made it easier with us to provide for sleeping berths, toilet rooms, dining cars and other conveniences which cannot be so readily furnished in equipment built on English lines of practice.

It has been intimated that these technical associations of railroad officials tend to discourage the application of the inventive mind to the improvement of railroad appliances. It is hardly to be expected that this generation will witness many more such striking improvements in railroad equipment as the air-brake, the automatic coupler and the vestibuled platform.

For, with each fundamental invention or novel application of familiar forces or devices, the field for original research is narrowed, mainly as to controlling features of equipment, partly as to details, and in no other department of railroad operation is uniformity so essential as in equipment to be interchanged throughout our country. Any principle, any device, any detail which obstructs such general use must be modified to meet this requirement, or be rejected, even though it be otherwise of merit.

The principal use of your Association is to determine in what respect this uniformity is essential and in what respect it is either unimportant or undesirable. In doing

this, you establish the limitations within which inventors must work, for the result of their labors to be available. Within those boundaries the field is free for them to exercise their ingenuity, and they are assisted to concentrate their efforts for their own benefit, by reason of the very restrictions which you have placed upon them.

This is strikingly illustrated by your action as to freight car couplers. For your Association laboriously and thoughtfully arrived at a type of coupler best suited for the purpose, but still left the field free for inventors to devise couplers which should conform to certain contour lines and other conditions essential to interchangeability among their several devices. The way was thus made clear for the introduction of many different couplers, each having its peculiar merits, yet all interchangeable. But for this action of your Association, there would have been a contest for recognition among couplers of different types, incapable of coupling with each other, each sustained by powerful and interested advocates ; and we should probably have seen a battle of the couplers, as we saw the battle of the gauges, indefinitely prolonged at great cost to the railroad companies, and with long continued exposure to accidents among railroad employees.

Your efforts in behalf of uniformity have not been of benefit to railroad companies alone. The air-brake and the vestibuled platform coupled automatically have almost eliminated the liability of a passenger to fatal injury from a butting collision. With the general adoption of the Master Car Builders' type of automatic freight car couplers, switching will cease to be a hazardous occupation, and the general application of the air-brake to freight trains will, it is to be hoped, bring the brakeman down from the top of the train ; free him from exposure to the weather greater than the storm-tossed sailor suffers, and reduce the casualties due to low bridges and tunnels.

It is because these several safety appliances have been made uniform in their action that we are to receive the

full benefit of their application to the million or more of cars that are used in common from the Atlantic to the Pacific, from the Great Lakes to the Gulf of Mexico. These great advantages to the traveling public and to railroad employees could only have been enjoyed by the mutual action of the railroad companies, made practicable through your Association, which has thereby become a public benefactor, as well as a valuable auxiliary to the companies which you represent.

As I look around me and think how many of the representative men of your Association have risen from the ranks, I recall the time when I took my dinner pail with me to work, little foreseeing that I should ever be honored by an invitation to participate in an occasion of this kind. Many of you must have had the same thought to pass through your minds, and it may not be out of place in my closing remarks to mention what must also have occurred to you. In railroad life, as in other careers of usefulness, the way to eminence does not lie among the alluring fields of recreation and ease, but along the rugged paths of application, self-restraint and self-improvement. And I earnestly wish that this thought could be as strongly impressed upon the minds of those young men who fill the railroad ranks to-day ; that they must be industrious, economical, studious and tractable, if they would secure for themselves that domestic happiness which, to most men, makes life worth living, which has drawn with you here to-day your wives and daughters, to grace this occasion with their presence, and to make it a social event as well as an opportunity for the discussion of technical matters connected with your duties as Master Car Builders.

## VALUE OF RAILROAD PROPERTY IN THE UNITED STATES AS SHOWN BY THE RE- PORT OF 1896 OF THE INTER-STATE COM- MERCE COMMISSION.

In an address delivered at the meeting of the American Railway Association on April 17, 1895, I called attention to the diminishing margin between the charge for transportation on railroads in the United States and the cost of performing the service, as obtained from the statistics given in the annual reports of the Inter-State Commerce Commission for the six years 1888 to 1893.

The statistics as to freight traffic showed decreases during that period as follows:

| TOTAL DECREASE.—CENTS PER TON MILE. |             |             |             |           |
|-------------------------------------|-------------|-------------|-------------|-----------|
|                                     | 1888.       | 1893.       | Decrease.   | Per Cent. |
| Revenue . . . . .                   | 1.001       | .878        | .123        | 12        |
| Cost . . . . .                      | .630        | .579        | .051        | 8         |
| Profit . . . . .                    | <u>.371</u> | <u>.299</u> | <u>.072</u> | <u>19</u> |

The statistics as to passenger traffic showed the following decreases:

| TOTAL DECREASE.—CENTS PER PASSENGER MILE. |             |             |             |           |
|---|-------------|-------------|-------------|-----------|
|   | 1888.       | 1893.       | Decrease.   | Per Cent. |
| Revenue . . . . .                         | 2.349       | 2.108       | .241        | 10        |
| Cost . . . . .                            | 2.042       | 1.955       | .087        | 4         |
| Profit . . . . .                          | <u>.307</u> | <u>.153</u> | <u>.154</u> | <u>50</u> |

In commenting upon these statistics I used the following language: "The annual approximation of these two lines of figures as we look along them toward the horizon before us is not an illusion, but an actual drawing together toward zero. We have postponed the critical

moment at which they will meet in the vanishing point, by economies, true and false, by a more enlightened use of the facilities at our command, and by requiring more work for less pay. But strive as we may between the conditions which confine our path on the one hand, and on the other cost and compensation, they cannot be kept parallel by changing the direction of one so long as the other changes at a greater angle; in other words, so long as the pay for doing the work decreases faster than the cost of doing it can be decreased."

Since the delivering of the address from which the above quotation is made, the Inter-State Commerce Commission has published its reports for the years 1894 and 1895, and we have now the opportunity to institute a comparison between the figures given above for 1893 and those for 1895.

RATE AND COST.—CENTS PER TON MILE.

|             | 1893. | 1895. | Decrease. | Per Cent. |
|-------------|-------|-------|-----------|-----------|
| Rate.....   | .878  | .839  | .039      | 4         |
| Cost.....   | .579  | .555  | .024      | 3         |
| Profit..... | .299  | .284  | .015      | 5         |

RATE AND COST.—CENTS PER PASSENGER MILE.

|           | 1893. | 1895. | Increase. | Decrease. | Per Cent. |
|-----------|-------|-------|-----------|-----------|-----------|
| Rate..... | 2.108 | 2.040 | ....      | .068      | 3         |
| Cost..... | 1.955 | 2.000 | .045      | ....      | 2         |
| Profit... | .153  | .040  |           | .113      | 74        |

These figures would seem to justify the assertion made in 1895 that the margin of profit between the rate and cost of transportation upon the railroads in this country was continuously approaching zero.

It is proper to state that the cost per ton mile and per passenger mile given above for 1895 is not taken from the reports of the Inter-State Commerce Commission.

In its report for 1894 the following statement is made. "Previous reports contained an estimate of the 'average cost of carrying one passenger one mile' and the 'average

cost of carrying one ton one mile.' In the present report these items do not appear, they having been abandoned on account of the uncertainty of the rule which it was necessary to adopt for their compilation."

In an address delivered at the meeting of the American Railway Association in October, 1891, on the "Cost of Transportation," I undertook at some length to demonstrate the futility of applying to the business of railroad transportation such units as those of the rate and cost per ton mile and per passenger mile; but as many of the assertions affecting railroad matters which are set forth in political speeches, legal arguments, and newspaper articles are based upon these figures as contained in the Inter-State Commerce Commission Reports, I have estimated them for the years 1894 and 1895, in the above comparisons, upon the basis used in previous reports.

For the purpose for which these comparisons are intended these figures are adequate, since they show a continuing decrease in rates more rapid than the decrease in cost, and a consequently steady diminution of the margin of profit from those rates applicable to a return on the capital invested in railroad property. But it was maintained that as this decreasing margin of profit per ton-mile and per passenger-mile was accompanied by a considerable increase in the volume of business, the resulting net revenue as a whole was remunerative.

The volume of business annually is shown in the Inter-State Commerce Commission Reports as follows:

|           | Freight Traffic.<br>Ton Miles, per Mile<br>of Line. | Passenger Traffic.<br>Pass. Miles, per Mile<br>of Line. |
|-----------|---|---|
| 1889..... | 448,069   | 75,325  |
| 1890..... | 487,245   | 75,751  |
| 1891..... | 502,705   | 79,641  |
| 1892..... | 543,366   | 82,284  |
| 1893..... | 548,401   | 83,378  |
| 1894..... | 457,254   | 81,333  |
| 1895..... | 479,490   | 68,572  |

From this statement it will be seen that the volume of traffic culminated in 1893. The freight traffic in the following year fell off 16 per cent., amounting to but a little more than in 1889, while even the inducements to travel offered in the year of the Columbian Exposition did not serve to maintain the passenger traffic at the figures of 1893.

In 1895 the volume of freight traffic showed a little improvement over that of the previous year, though not yet equalling the figures of 1890, while the woful decrease in passenger traffic, even as compared with the figures of the Columbian Exposition year, gave evidence of the fact that the passenger traffic of 1894 would have fallen off, as the freight traffic did in that year, but from the help received from that source. As a fact, the passenger traffic in 1895 was, in volume, 17 per cent. less than in 1893 and even 9 per cent less than in 1889.

We have now to see how the results of railroad operations for 1895 affected the value of railroad property:

## RAILWAY CAPITAL, 1895.

|                      |                 |                 |
|----------------------|-----------------|-----------------|
| Common stock.....    | \$4,201,697,351 |                 |
| Preferred stock..... | 759,561,305     |                 |
|                      | <hr/>           | \$4,961,258,656 |
| Bonds.....           |                 | 4,641,755,548   |
|                      |                 | <hr/>           |
| Total capital.....   |                 | \$9,603,014,204 |

This statement does not include the following items:

|                                  |               |
|----------------------------------|---------------|
| Miscellaneous obligations.....   | \$445,221,472 |
| Income bonds.....                | 242,603,226   |
| Equipment trust obligations..... | 55,915,327    |
|                                  | <hr/>         |
| Total.....                       | \$743,740,025 |

These items have been excluded for the following reasons:

1. The character of the so-called miscellaneous obligations is not described in the Inter-State Commerce Commis-

sion Reports in such a way as to explain the nature of their liens upon the railroad property.

2. Income bonds may be considered as having been issued to a great extent in the way of a bonus in the reorganization of railroad corporations and as standing in a different relation to the property than that of mortgage bonds.

3. Equipment trust obligations may be considered in many cases as liens merely on equipment, gradually discharged by mileage rentals which appear in the car-mileage accounts.

4. But the principal reason for excluding these classes of investments in railroad property in this investigation of the value of railroad property is a desire to forestall the assumption that the railroad property is overvalued.

Having thus written off, as it were, from the valuation of this property the sum of \$743,000,000, and brought it down to the face value of the capital represented by stock and bonds, viz., \$9,603,014,204, we have next to ask what did this investment produce in 1895? The answer as given in the Inter-State Commerce Commission Reports is as follows:

| GROSS EARNINGS FROM RAILROAD OPERATIONS, 1895. |                 |
|--|-----------------|
| Passenger revenue.....                         | \$252,246,180   |
| Mail.....                                      | 30,969,746      |
| Express.....                                   | 24,284,508      |
| Other earnings.....                            | 6,114,786       |
| Total passenger service earnings.....          | \$313,615,220   |
| Freight revenue.....                           | \$729,993,462   |
| Other earnings....                             | 4,140,850       |
| Total freight service earnings.....            | \$734,134,312   |
| Other earnings from operations.....            | 27,088,987      |
| Unclassified earnings.....                     | 532,943         |
| Total earnings from operation....              | \$1,075,371,462 |

This statement does not include income from other sources, \$132,432,133, for the reason that this item repre-



sents not only income from other property than railroad property, but also income from investments in railroad stocks and bonds which has already been included in the above statement of "Earnings from Railroad Operations." But these figures represent the gross earnings, from which must be deducted the cost of operations in order to ascertain the net earnings applicable to the payment of fixed charges and dividends.

The net earnings are shown as follows:

NET EARNINGS FROM RAILROAD OPERATIONS, 1895.

|                         |                      |
|-------------------------|----------------------|
| Gross earnings.....     | \$1,075,371,462      |
| Operating expenses..... | 725,720,415          |
| Net earnings.....       | <u>\$349,651,047</u> |

It took then over 68 per cent. of the gross earnings to meet the cost of operations, leaving 32 per cent. available for fixed charges and dividends.

If this amount had been divided equally among the holders of stock and bonds it would have been sufficient to have paid 3.6 per cent. on the total amount so invested. But it was not divided that way; only to a partial extent did these net earnings reach the stockholders.

The Inter-State Commerce Commission Report shows the distribution of these net earnings as follows:

DISTRIBUTION OF NET EARNINGS, 1895.

|  |                      |
|--|----------------------|
| Dividends, common stock.....                   | \$71,388,378         |
| Dividends, preferred stock.....                | 13,899,165           |
|  | <u>\$85,287,543</u>  |
| Interest on bonds.....                         | 223,420,604          |
| Total paid on stock and bonds.....             | <u>\$308,708,147</u> |
| Interest paid on miscellaneous obligations.... | 28,125,640           |
| Interest paid on income bonds.....             | 966,676              |
| Interest paid on current liabilities.....      | 7,860,261            |
| Net earnings not accounted for.....            | 3,990,323            |
|  | <u>\$349,651,047</u> |
| Total net earnings.....                        | \$349,651,047        |

The net earnings paid out as dividends and as interest on funded obligations, was paid on but a part of the total investment, as follows:

|                     | Capital Stock.             | Per Cent. of Total. |
|---------------------|----------------------------|---------------------|
| Dividends paid..... | \$1,485,618,453            | 30                  |
| Nothing paid.....   | 3,475,640,203              | 70                  |
| <b>Total .....</b>  | <b>\$4,961,258,656</b>     |                     |
|                     | Mortgage Bonds.            |                     |
| Interest paid.....  | \$4,027,427,255            | 87                  |
| Nothing paid.....   | 614,328,293                | 13                  |
| <b>Total .....</b>  | <b>4,641,755,548</b>       |                     |
|                     | Miscellaneous Obligations. |                     |
| Interest paid ..... | \$390,723,184              | 88                  |
| Nothing paid.....   | 54,498,288                 | 12                  |
| <b>Total .....</b>  | <b>\$445,221,472</b>       |                     |
|                     | Income Bonds.              |                     |
| Interest paid.....  | \$20,868,347               | 9                   |
| Nothing paid.....   | 221,734,879                | 91                  |
| <b>Total .....</b>  | <b>\$242,603,226</b>       |                     |

From these figures it would seem that the proportion of secured capital invested in railroad property which has received some return is far larger than the proportion of the investment in capital stock which has been similarly fortunate, while the investment in income bonds is virtually based upon hope deferred.

Taking another view of this subject, the total investment as divided between that which received something and that which received nothing, is as follows:

#### RETURNS ON RAILROAD INVESTMENTS, 1895.

|                       | Amount Receiving Income. | No Income.             | Total.                  |
|-----------------------|--------------------------|------------------------|-------------------------|
| Capital stock.....    | \$1,485,618,453          | \$3,475,640,203        | \$4,961,258,656         |
| Mortgage bonds..      | 4,027,427,255            | 614,328,293            | 4,641,755,548           |
| Misc. obligations..   | 390,723,184              | 54,498,288             | 445,221,472             |
| Income bonds....      | 20,868,347               | 221,734,879            | 242,603,226             |
| <b>Total .....</b>    | <b>\$5,924,637,239</b>   | <b>\$4,366,201,663</b> | <b>\$10,290,838,902</b> |
| <b>Per cent .....</b> | <b>57</b>                | <b>43</b>              |                         |

So it seems that nearly one half of the capital invested in railroad property in 1895 received no return whatever. The average income on that which did receive anything was as follows:

AVERAGE RETURNS IN 1895 ON RAILROAD INVESTMENTS WHICH RECEIVED ANY RETURNS WHATEVER.

|                         | Investment.     | Returns.      | Per Cent. |
|-------------------------|-----------------|---------------|-----------|
| Capital stock .....     | \$1,485,618,453 | \$85,287,543  | 5.7       |
| Mortgage bonds .....    | 4,027,427,255   | 223,420,604   | 5.5       |
| Misc. obligations ..... | 390,723,184     | 28,125,640    | 7.1       |
| Income bonds .....      | 20,868,347      | 966,676       | 4.6       |
| Total .....             | \$5,924,637,239 | \$337,800,463 | 5.7       |

These figures then go to show that, although nearly one half of the total investment in railroad property received no return whatever, the average return on the half that did receive anything was less than six per cent. It should be stated that the distribution of returns shown above as between mortgage bonds, miscellaneous obligations, and income bonds is not clearly made in the Inter-State Commerce Commission Reports, but has been deduced from the figures therein given in another form and is approximately correct; the total figures, of course, being as stated in the report.

The people of the United States are therefore having the free use of about one half of the capital invested in railroad property. For the use of the other half they have paid less than six per cent.

They have paid,

|                            |               |
|----------------------------|---------------|
| As dividends .....         | \$85,287,543  |
| As interest on bonds ..... | 223,420,604   |
| Total .....                | \$308,708,147 |

For this amount they have had the use of 177,746 miles of road, which is capitalized as follows, per mile of road:

|                   |                    |
|-------------------|--------------------|
| In stock at ..... | \$27,912 per mile. |
| In bonds at ..... | 26,114     "       |
| Total .....       | \$54,026     "     |

The dividends actually paid averaged 5.7 per cent. on \$1,485,618,453  
 The interest on bonds averaged 5.5 per cent. on..... 4,027,427,255

Total..... \$5,513,045,708

The number of miles of road represented by this productive capital cannot be ascertained from the reports, but it can be stated that the total mileage is represented by capital, respectively, productive and unproductive, as follows:

#### STOCK AND BONDS, PER MILE OF ROAD.

|                    | Stock.   | Bonds.   | Total.   |
|--------------------|----------|----------|----------|
| Productive.....    | \$8,358  | \$22,658 | \$31,016 |
| Unproductive ..... | 19,554   | 3,456    | 23,010   |
| Total.....         | \$27,912 | \$26,114 | \$54,026 |

So that the total capital per mile of road on which there is any productive return averages a little over \$31,000 per mile.

There is a prevailing impression that the nominal capitalization of the railroad property in this country has been largely increased in the past few years by means of reorganization of bankrupt roads. The figures as given in the reports of 1888 and 1895 are as follows:

#### AVERAGE CAPITALIZATION, PER MILE OF ROAD.

|                           | 1888.    | 1895.    |
|---------------------------|----------|----------|
| Common stock .....        | \$24,411 | \$23,639 |
| Preferred stock .....     | 3,821    | 4,273    |
| Total stock.....          | \$28,232 | \$27,912 |
| Bonds.....                | 27,880   | 26,114   |
| Total capitalization..... | \$56,112 | \$54,026 |

From the above statement it seems that the impression referred to is so far erroneous, that the capitalization per mile of road has actually decreased, notwithstanding the manifestly improved condition of the railroads at the date of the latter report.

## RECAPITULATION.

Let us now compare the facts exhibiting the value of railroad property as already taken from the reports for 1888 and 1895.

|   | 1888.          | 1895.         |
|---|----------------|---------------|
| Miles of line .....                               | 136,883        | 177,746       |
| Freight traffic :                                 |                |               |
| Rate per ton mile.....                            | 1.001 cents.   | 0.839 cents.  |
| Cost per ton mile .....                           | 0.630 "        | 0.555 "       |
| Profit per ton mile.....                          | 0.371 "        | 0.284 "       |
| Passenger traffic :                               |                |               |
| Rate per passenger mile.....                      | 2.108 cents.   | 2.040 cents.  |
| Cost per passenger mile.....                      | 1.955 "        | 2.000 "       |
| Profit per passenger mile.....                    | 0.153 "        | 0.040 "       |
| Per mile of line :                                |                |               |
| Freight, ton miles (1889).....                    | 448,069        | 479,490       |
| Passenger, passenger miles (1889).....            | 75,325         | 68,572        |
| Per mile of line:                                 |                |               |
| Total earnings, freight service ....              | \$4,480        | \$4,130       |
| Total earnings passenger service .                | 2,026          | 1,765         |
| Total earnings from other operations              | 146            | 155           |
| Total from all operations.....                    | \$6,652        | \$6,050       |
| Cost of all operations.....                       | 4,847          | 4,082         |
| Net from all operations..                         | \$2,805        | \$1,968       |
| Common stock.....                                 | 24,411         | 23,639        |
| Preferred stock.....                              | 3,821          | 4,273         |
| Total stock.....                                  | \$28,232       | \$27,912      |
| Bonds .....                                       | 27,880         | 26,114        |
| Total stock and bonds.....                        | \$56,112       | \$54,026      |
| Proportion gross earnings to stock and bonds..... | 11.8 per cent. | 11.2 percent. |
| Proportion net earnings to stock and bonds .....  | 4.0 "          | 3.6 "         |

If the entire net earnings from operation in 1895 had been available for distribution among the stock and bonds only, they would have been sufficient for an average return of 3.6 per cent. on this entire capitalization. But the entire amount, as has been shown, was not so available. After

payments made on account of the miscellaneous obligations, etc., already referred to, the amount actually diverted to dividends on stock and interest on bonds averaged per mile of line:

|                           |                               |
|---------------------------|-------------------------------|
| In dividends.....         | \$479; equal to 1.3 per cent. |
| In interest on bonds.. .. | 1257; equal to 4.4 per cent.  |

---

|                                |                                 |
|--------------------------------|---------------------------------|
| In dividends and interest..... | \$1,736; equal to 3.2 per cent. |
|--------------------------------|---------------------------------|

If we are to accept the statistics of the Inter-State Commerce Commission as a basis for estimating the intrinsic value of railroad property in the immediate future, we must recognize:

First, a continuing tendency to lower rates of transportation.

Second, that the marvellous increase in the volume of traffic which has hitherto tempted capitalists to promote new railroad enterprises has ceased.

Third, that if the average expectation of returns on capital already invested is now but 3.2 per cent., the prospect of returns from new enterprises, intended "to build up the country" is indeed remote.

#### COST OF TRANSPORTATION.

This is, however, still one more probability to be considered, and that is the hope of increased net returns from the same gross revenue by means of increased economies, and this leads to a consideration of the cost of performing the service. To what extent is such a hope justified by the statements on which our conclusions have been reached as to the gross and net earnings of the railroads in this country? Here, instead of relying upon the illusory units of the cost per ton mile and per passenger mile, we must depend upon the train mile units in the effort to analyze the items of cost of service and their relation to the varying volume of traffic.

This phase of the subject was also considered in the ad-

dress at first referred to, in connection with the Inter-State Commerce Commission Reports from 1883 to 1885.

The average revenue and cost per train mile for each of those years were there given as follows, the revenue alone for 1895 being now added:

## REVENUE AND COST PER TRAIN MILE.

|                        | 1888.    | 1893.    | 1895.    |
|------------------------|----------|----------|----------|
| Freight train, mile:   |          |          |          |
| Revenue.....           | \$1.653  | \$1.627  | \$1.612  |
| Cost.....              | 1.064    | 1.067    | .....    |
| Net.....               | \$0.589  | \$0.560  |          |
| Passenger train, mile: |          |          |          |
| Revenue.....           | \$1.0629 | \$1.0682 | \$0.9787 |
| Cost.....              | 0.8116   | 0.8404   | .....    |
| Net.....               | \$0.2513 | \$0.2278 |          |

As stated in that address, the figures for the cost per passenger train mile are given somewhat differently in different parts of the report, but those are used above which seem most capable of analysis. They show in both classes of service an increased cost of performance. The apparent causes for this result are there considered at length.

We are unable to extend this comparison farther, as since 1893 the reports do not distinguish the cost per mile between freight and passenger trains. The comparison per cost of all trains is given as follows, for the years 1888, 1893 and 1895:

## REVENUE AND COST PER TRAIN MILE.

|              | 1888.      | 1893.      | 1895.      |
|--------------|------------|------------|------------|
| All trains:  |            |            |            |
| Revenue..... | \$1.46.719 | \$1.43.229 | \$1.35.947 |
| Cost.....    | 96.050     | 97.272     | 91.820     |
| Net .....    | \$0 50.669 | \$0.45.957 | \$0.44.127 |

From this it is evident, as already asserted, that the compensation for transportation is decreasing more rapidly than the cost of performance.

The train mileage in the three years under comparison, was as follows:

| TRAIN MILEAGE.         |             |             |             |
|------------------------|-------------|-------------|-------------|
|                        | 1888.       | 1893.       | 1895.       |
| Freight trains.....    | 370,121,110 | 508,715,506 | 449,291,238 |
| Passenger trains ..... | 243,493,547 | 335,618,770 | 317,565,615 |
| Total.....             | 613,614,657 | 844,334,276 | 766,856,853 |

| PERCENTAGE OF TOTAL.   |     |     |     |
|------------------------|-----|-----|-----|
| Freight trains.....    | .60 | .60 | .57 |
| Passenger trains ..... | .40 | .40 | .42 |

| PER MILE OF LINE.      |        |        |        |
|------------------------|--------|--------|--------|
| Freight trains.....    | 2704   | 2996   | 2527   |
| Passenger trains.....  | 1778   | 1976   | 1787   |
| Total trains.....      | 4482   | 4972   | 4314   |
| Freight revenue .....  | \$4480 | \$4881 | \$4130 |
| Passenger revenue..... | 2026   | 2110   | 1765   |
| Total.....             | \$6506 | \$6991 | \$5895 |

PERCENTAGE OF FREIGHT AND PASSENGER REVENUE, TOTAL.

|                        | 1888. | 1893. | 1895. |
|------------------------|-------|-------|-------|
| Freight revenue.....   | .69   | .70   | .70   |
| Passenger revenue..... | .31   | .30   | .30   |

The following conclusions are to be drawn from these mileage figures, viz.:

That the proportion of passenger train mileage to freight train mileage has increased.

That the total freight train mileage per mile of line was 6 per cent. less in 1895 than in 1888 and the passenger train service but little more, while the freight revenue per mile of line had decreased 8 per cent. and the passenger revenue 12 per cent.

That the saving in freight-train service has been greater than in passenger-train service is due to the increased capacity of freight equipment. An increasing proportion of the total number of freight cars is of thirty tons' capacity. The capacity of both freight and passenger locomotives has also increased, but the additional power in the passenger



locomotives has been absorbed in quicker schedules and heavier cars.

Referring specially to freight service, some figures may be given as to the use made of the increased capacity of freight equipment.

## TONNAGE STATISTICS.

|  | 1889.          | 1893.          | 1895.          |
|--|----------------|----------------|----------------|
| Freight tonnage.....                           | 539,639,583    | 745,119,482    | 696,761,171    |
| Ton mileage .....                              | 68,727,223,146 | 93,588,111,833 | 85,227,515,891 |
| Tons carried one mile,<br>per mile of line.... | 448,070        | 551,232        | 479,490        |
| Average haul miles..                           | 127.36         | 125.60         | 122.32         |
| Tons per train.....                            | 179.35         | 183.97         | 189.60         |

The figures for 1889 are here used, as they are not given for 1888. In these seven years the

|   |              |
|---|--------------|
| Total tonnage has increased .....                       | 30 per cent. |
| Total ton mileage has increased.....                    | 24 " "       |
| Tons carried one mile, per mile of line, increased..... | 7 " "        |
| Average haul has decreased.....                         | 4 " "        |
| Tons per train have increased.....                      | 6 " "        |

The fact that the average haul per ton has decreased 4 per cent. accounts for the disparity between the total tonnage and ton mileage. It shows that, from some cause, there was not so large a proportion of long-haul freight in 1895 as in 1889. The unnecessary extension of railroad facilities is shown by an increase in those seven years of only 7 per cent. in the number of tons carried one mile, per mile of line, while the total ton mileage has increased 24 per cent. It is also to be observed that, notwithstanding the largely increased capacity of freight locomotives and freight cars during these years, the average tonnage per train has increased but 6 per cent.

As compared with the operations of the year 1888, the earnings and expenses per mile of line in 1895 compare as follows:

|  |             |
|--|-------------|
| Freight earnings have decreased.....   | 8 per cent. |
| Passenger earnings have decreased..... | 8 " "       |
| Gross earnings have decreased.....     | 9 " "       |
| Net earnings have decreased....        | 17 " "      |
| Cost of operation has decreased.....   | 6 " "       |

It seems in vain to hope for an arrest of the continuing downward tendency of freight and passenger rates, and unless the cost of operations can be reduced proportionately with the reduction in rates, net earnings will likewise continue to decrease in an accelerated ratio. This is plain if gross earnings are to continue to decrease at the rate of 9 per cent. while the cost of operations decrease only at the rate of 6 per cent.

Indeed, it is doubtful whether a continually decreasing ratio in the cost of operations can be maintained. Freight and passenger rates can be reduced by the simple order of a traffic official, but the superintendent has to deal with pay-rolls and supply vouchers which will not down at his mere bidding. For this reason I have thought that it would be of interest to present some figures in detail as to the cost of operations in 1895 as compared with those presented for previous years in the address which brought the subject down to 1893. As the Inter-State Commerce Commission has ceased to give the items of cost separately for freight trains and passenger trains since 1893, the comparisons of these items which I made up to that date cannot be continued for 1895 and the subject must therefore be treated differently in this paper.

As the cost of operations is classified in those reports the proportion among the several classes has been as follows:

COST OF OPERATIONS —PROPORTION TO TOTAL COST.

|  | 1888. | 1893  | 1895. |
|--|-------|-------|-------|
| Maintenance of way and structures..... | 22.60 | 20.45 | 19 84 |
| Maintenance of equipment .....         | 17.09 | 16.53 | 15.68 |
| Conducting transportation.....         | 50.26 | 52.60 | 59 41 |
| General expenses.....                  | 9.34  | 10 33 | 4.95  |
| Unclassified.....                      | .71   | .09   | .12   |

The change in the proportion of expenses as classified, from 1883 to 1895, is most marked in the increased percentage to conducting transportation and the decrease to general expenses. This difference is accounted for in the report for 1895, as a difference in the classification of ex-

penses; certain items such as stationery and printing, advertising, commissions, rents, outside agencies, and superintendence, before charged entirely to general expense account, having been to some extent distributed among the other classes. All of the deductions, however, from general expenses did not go to conducting transportation; some of them were added to maintenance of way and to equipment. Yet both of these percentages show a decrease, particularly in the case of maintenance of way.

This classification of the cost of operations may be presented in another way as divided per mile of line:

## COST OF OPERATIONS PER MILE OF LINE.

|                               | 1888.         | 1893.         | 1895.         |
|-------------------------------|---------------|---------------|---------------|
| Maintenance of way .....      | \$982         | \$997         | \$810         |
| Maintenance of equipment....  | 743           | 806           | 640           |
| Conducting transportation.... | 2185          | 2565          | 2425          |
| General expenses.....         | 406           | 504           | 202           |
| Unclassified ... ..           | 31            | 4             | 5             |
| Total.....                    | <u>\$4347</u> | <u>\$4876</u> | <u>\$4182</u> |

The railroad property of this country was operated more cheaply, per mile of line, in 1895 than in 1888, and the reduction since the pressure came in 1893 has been remarkable. The superintendents seem to have done their part in the reduction of expenses, though they could not keep the pace set for them in the reduction of rates by traffic officials.

Comparing the performance of the years 1888 and 1895, we find a reduction in each class of expenses except in that of conducting transportation. Here alone has there been an actual increase. The decreased cost in maintenance of way, per mile of line, is directly attributable to two causes: to the definite substitution of steel rails for iron and to the general adoption of heavier sections of rails. The track has thus become more entitled to be called "permanent way," and these costly improvements, though they have largely swelled capital account, have also served

to decrease the cost of operation, and in this way to help out income.

The cost of maintenance of equipment does not have that direct relation to the length of line as does the cost of maintenance of way. It bears a much more direct relation to the number of engines and cars in service. These statistics are not available for 1888. In the following comparison those for 1889 are used.

#### EQUIPMENT, PER MILE OF LINE.

|                             | 1889.     | 1893.     | 1895.     |
|-----------------------------|-----------|-----------|-----------|
| Locomotives, No.....        | 29,036    | 34,788    | 35,699    |
| Per 100 miles of line.....  | 18.9      | 20.4      | 20.8      |
| Cars of all kinds.....      | 1,068,555 | 1,273,946 | 1,270,561 |
| Per 100 miles of line ..... | 695.9     | 750.3     | 714.7     |

The decreased cost of maintenance of equipment per mile of line in 1895 as compared with 1894 may be due to the decreased number of cars per mile of line, but the decrease as compared with 1889 cannot be accounted for in the same way; though, when we ascertain the relative cost per train mile, the result is as follows:

#### MAINTENANCE OF EQUIPMENT, PER TRAIN MILE.

|                              | 1889.       | 1893.       | 1895.       |
|------------------------------|-------------|-------------|-------------|
| Train miles.....             | 660,441,377 | 844,338,276 | 766,856,853 |
| Cost per train mile, cents.. | 16.1        | 16.2        | 14.8        |

The uniform cost per train mile in 1889 and 1893, compared with the decreased cost in 1895, invites the conclusion that, in the last-named year, operating expenses were reduced by neglecting to maintain equipment in good order.

We have now to consider the cost of conducting transportation. This item appears in the accounts as follows:

#### CONDUCTING TRANSPORTATION.

|                               | 1889.       | 1893.       | 1895.       |
|-------------------------------|-------------|-------------|-------------|
| Per mile of line .....        | \$2185      | \$2565      | \$2425      |
| Per train mile, cents.....    | 50.1        | 51.5        | 56.2        |
| Per cent. of total expenses.. | 51.53       | 52.60       | 59.41       |
| Train miles.....              | 660,441,377 | 844,338,276 | 766,856,853 |

While the cost per mile of line is less in 1895 than in 1889, the cost per train mile has risen from 50.1 cents to

56.2 cents. This accounts for the fact that the cost of conducting transportation, which amounted to but 51.53 per cent. of the total expense account in 1889, was 59.41 per cent. of the total in 1895.

It is singular that such notable economies should have been effected in 1895 in maintenance of way and of equipment, while the result should have been so different in the cost of conducting transportation.

I have endeavored to account for the decreased cost in maintenance of way by the substitution of steel rails for iron and the substantial termination of that work. I might have included the filling of trestles and the replacing of wooden bridges by iron as other causes for this decrease of expenses. I have suggested that the decrease in the item of maintenance of equipment is possibly due to the postponement of repairs, principally to freight cars. I have now to endeavor to account for the remarkable fact that, with a considerable decrease in train mileage, the department of conducting transportation has cost 4.7 cents more per train mile in 1895 than in 1893. This is the more remarkable as a principal item in this department is wages, which are for the most part paid by the train mile. This is a fact of such importance that I prefer to treat it separately at some length. The remaining item of general expenses amounted in 1888 to \$406 per mile of line, to \$504 in 1893, and to but \$202 in 1895. The reduction in 1895 is mainly accounted for by a more correct distribution of certain items of expense to other accounts which had before been charged to this account, but the whole amount included under the head of general expenses, constituting in 1895 less than 5 per cent. of the total, is too small for extended comment.

As just intimated, the matter of wages paid employees is of such importance as to warrant the specific investigation of the subject contained in my address delivered at the meeting of the American Railway Association on April

11, 1894, to which further reference will be made. The total number of railway employees reported in each of several years is as follows:

NUMBER OF RAILWAY EMPLOYEES.

|           | Total.  | Per 100 Miles of Line. |
|-----------|---------|------------------------|
| 1889..... | 704,743 | 459                    |
| 1890....  | 749,301 | 479                    |
| 1893..... | 873,602 | 515                    |
| 1895 ..   | 785,034 | 441                    |

The number of employees is not reported for 1888, nor is the detailed information concerning them fully given until the year 1890, but the maximum number of employees per mile of line was reached in 1893 and the minimum in 1895.

These employees were distributed among the several departments proportionally as follows:

PROPORTIONATE DISTRIBUTION OF EMPLOYEES.

| Department.                  | 1890. | 1893. | 1895. |
|------------------------------|-------|-------|-------|
| Maintenance of way.....      | 26.1  | 29.3  | 28.9  |
| Maintenance of equipment...  | 16.5  | 20.1  | 19.8  |
| Conducting transportation... | 37.4  | 45.5  | 46.2  |
| General Administration.....  | 3.3   | 4.1   | 4.1   |
| Unclassified.....            | 16.7  | 1.0   | 1.0   |

The figures for 1890 are not valuable for comparison since so large a proportion of the number of employees remained unclassified. As between 1893 and 1895, the relative distribution was quite uniform, there having been a slightly increased proportion in 1895 under the head of conducting transportation, which includes nearly one half of the total number of employees.

It may be profitable to examine the changes in the several departments more in detail, but the conclusions so far as they relate to 1890 are vitiated by the deficient distribution in that year. The principal value of this discussion relates, therefore, to the years 1893 and 1895.

The number employed in maintenance of way is reported as follows:

## EMPLOYEES.—MAINTENANCE OF WAY.

|           | Total.  | Per 100 Miles of Line. | Cost of Department<br>per Mile of Line. |
|-----------|---------|------------------------|---|
| 1890..... | 195,367 | 125                    | \$976                                   |
| 1893..... | 256,212 | 151                    | 997                                     |
| 1895..... | 226,839 | 128                    | 810                                     |

With an increase in force of 20 per cent., the cost of maintenance of way was but 2 per cent. more in 1893 than in 1890, while in 1895 with 2 per cent. increase in force over 1890, the cost per mile was 16 per cent. less. As already stated, this economy was due to the completion of the work of substituting steel rails for iron, and the substitution of embankments and iron bridges for wooden bridges and viaducts. How much of this saving was taken out of wages is hard to say. The average wages of a section foreman is reported at \$1.76 per day in 1892, and at \$1.70 in 1895, the average wages for trackmen being respectively \$1.22 and \$1.17.

A comparison of 1893 with 1895 shows a decrease of 15 per cent. in the number of employees per 100 miles of line, and of 18 per cent. in the cost of the department.

## EMPLOYEES.—MAINTENANCE OF EQUIPMENT.

|           | No. Employees. | Per 100 Miles Line. | Cost Department per<br>Mile of Line. |
|-----------|----------------|---------------------|--------------------------------------|
| 1890..... | 125,403        | 79                  | \$730                                |
| 1893..... | 175,464        | 103                 | 806                                  |
| 1895..... | 155,630        | 88                  | 640                                  |

In 1895 there was a decrease of 14 per cent. in the number of employees per 100 miles of line, and of 20 per cent. in the cost of this department per mile of line as compared with 1893. It has already been stated that between these years the cost of this department per train mile decreased from 16.2 cents to 14.8 cents, a decrease of 8 per cent. The very considerable decrease in the number of employees sustains the opinion already expressed, that the diminished cost of maintenance of equipment in 1895 was attained by neglecting repairs.

## EMPLOYEES.—CONDUCTING TRANSPORTATION.

|           | No. Employees. | Per 100 Miles Line. | Cost Department per<br>Mile of Line. |
|-----------|----------------|---------------------|--------------------------------------|
| 1890..... | 280,301        | 179                 | \$2264                               |
| 1893..... | 397,915        | 234                 | 2565                                 |
| 1895..... | 362,419        | 204                 | 2425                                 |

Disregarding the figures given for 1890, for the reasons above stated, it will be noted that in 1895 there was a decrease of 12 per cent. in the number of employees per mile of line, and of 5 per cent. in the cost of this department as compared with 1893.

The fluctuations in the cost of this department bears a more direct relation to the volume of traffic than do those in the cost of any other of the departments as classified in these reports, and, as this department in 1895 covered nearly 60 per cent. of the total expense and 46 per cent. of the total number of employees, it may be well to examine into its affairs in greater detail for the years 1893 and 1895.

## DISTRIBUTION OF EMPLOYEES.

| How Employed.                               | Total Number. |         | Per 100 Miles of Line. |       |
|---|---------------|---------|------------------------|-------|
|   | 1893.         | 1895.   | 1893.                  | 1895. |
| Station agents.....                         | 28,019        | 29,014  | 17                     | 16    |
| Other stationmen..                          | 75,181        | 73,569  | 44                     | 41    |
| Enginemen.....                              | 38,781        | 34,718  | 23                     | 20    |
| Firemen.....                                | 40,359        | 35,516  | 24                     | 20    |
| Conductors.....                             | 27,537        | 24,776  | 16                     | 14    |
| Other trainmen.....                         | 72,959        | 62,721  | 43                     | 35    |
| Switchmen, flagmen, and<br>watchmen.....    | 46,048        | 43,158  | 27                     | 24    |
| Telegraph operators and<br>dispatchers..... | 22,619        | 20,984  | 13                     | 12    |
| Unclassified.....                           | 46,412        | 37,963  | 27                     | 22    |
| Total.....                                  | 397,915       | 362,419 | 234                    | 204   |

The reduction as shown above affected every class of transportation employees, but in different proportions.



For every engineman and fireman that was dropped, there were also two conductors and eight brakemen. This corresponds very nearly to an ordinary train crew, as the conductors and brakemen generally make more mileage than the engine crew does. For each station agent dropped there were also five stationmen, three switchmen, etc., one telegraph operator, and five unclassified employees.

It is easy to ascertain whether the decrease in the number of train employees, compared with the decrease in the train mileage, as is shown by the following statement :

**AVERAGE ANNUAL TRAIN MILEAGE FOR EACH TRAIN EMPLOYEE.—  
AVERAGE MILES RUN ANNUALLY.**

| How Employed.      | 1893.  | 1895.  |
|--------------------|--------|--------|
| Enginemen.....     | 21,766 | 22,088 |
| Firemen .....      | 20,920 | 21,591 |
| Conductors.....    | 31,021 | 30,951 |
| Brakemen, etc..... | 11,572 | 12,226 |

As between the several classes of employees it will be seen that the engineman averages a little higher mileage than the fireman, and that the conductor averages about half as much mileage as the engineman. The average mileage of the brakeman is less than one third of that of the conductor; *i.e.*, an average of more than three brakemen in a train crew.

Comparing 1893 and 1895, the reduction among the train employees follows the decreased mileage very closely, still there is a higher average train mileage for each class of employees except the conductors.

**EMPLOYEES IN GENERAL ADMINISTRATION.**

|            | No. Employees. | Per 100 Miles Line. | Cost Department per<br>Mile of Line. |
|------------|----------------|---------------------|--------------------------------------|
| 1890 ..... | 24,648         | 16                  | \$449                                |
| 1893.....  | 35,384         | 21                  | 504                                  |
| 1895.....  | 52,525         | 18                  | 202                                  |

The change in the manner of distributing the charges to this department between 1893 and 1895 renders valueless any comparison of the figures for those years, as has al-

ready been explained, but the total amount involved is so small that it may be disregarded in considering the cost of operations as a whole.

In my address before the American Railway Association on April 11, 1894, already referred to, it was stated that salaries and wages constituted about two thirds of the total cost of operations of an average railroad in this country. It is, therefore, plainly the case that the welfare of the vast body of railway employees is closely associated with the fluctuations in the volume of traffic, and in the rates of compensation for that service.

#### EMPLOYEES IN 1893 AND 1895.

|               | Total Number. | Per 100 Miles of Line. |
|---------------|---------------|------------------------|
| 1893.....     | 873,602       | 515                    |
| 1895.....     | 785,034       | 441                    |
| Decrease..... | 88,568        | 74                     |

Of that great army, approximately one million of men, that was actively engaged in railroad service in 1893, nearly 90,000 had been discharged in 1895.

These men were dismissed from the several classes of employment as follows:

#### DECREASE IN THE SEVERAL CLASSES OF EMPLOYEES FROM 1893 TO 1894.

|                            | 1893.   | 1895.   | Decrease. | Per Cent. |
|----------------------------|---------|---------|-----------|-----------|
| Maintenance of way.....    | 256,212 | 226,839 | 29,373    | 11        |
| Maintenance of equipment.. | 175,464 | 155,630 | 19,834    | 11        |
| Conducting transportation. | 397,915 | 362,419 | 35,496    | 9         |
| General expenses .....     | 35,884  | 32,525  | 2,859     | 8         |
| Unclassified .....         | 8,627   | 7,621   | 1,006     | 11        |
| Total.....                 | 873,602 | 785,034 | 88,568    | —         |

The reduction fell heaviest, proportionately, on the departments of maintenance of way and equipment, which was to be expected, since repairs and improvements may be deferred when times are hard, but trains must be kept running.

## CONCLUSIONS.

The information contained in the reports of the Inter-State Commerce Commission for the period of eight years from 1888 to 1895 has now been analyzed and presented in a variety of ways as applicable to a consideration of the present value of railroad property in this country, especial attention having been given to the conditions affecting it in 1888, the date of the first report; in 1893, when the volume of traffic had reached its height, and in 1895, the latest date for which statistics have been published. Attached to this paper are several tables in which these statistics are presented for each of the years reported upon.

The conclusions to be drawn from these reports are principally as follows:

The railroad mileage of this country increased between 1888 and 1893 from 136,883 to 169,779 miles, an average annual increase of 6579 miles. It increased in 1894 5911 miles, and in 1895 2056 miles, the total mileage at the end of that year being 177,746 miles.

The great system of railways which has been at the foundation of the development of the resources of our country may be looked upon as substantially complete. There will be but little more railroad constructions for the purpose of "building up the country"; additional mileage hereafter will be constructed as may be required for existing traffic. The demand for additional capital will be mainly for the improvement of existing lines, and greater attention will be paid by capitalists to safe investments than to speculative profits. The day for exploiting state and municipal treasuries in the interest of promoters has passed away, never to return. Would that it could be said that there would be no return of the bankruptcies, receiverships, and reorganizations which follow upon the trail of these same promoters after their occupation has vanished.

But how can this be expected when we are informed

that in 1895 there was 70 per cent. of the capital stock of the railroads of this country, or \$3,475,000,000, on which no dividend was paid, while in 1888 but 61 per cent., or \$2,374,000,000, went without a dividend? Nor has the total capital stock, per mile of line, increased in the interim. It was stated at \$28,232 per mile of line in 1888 and at \$27,912 in 1895.

In the meantime the gross earnings per mile of line, which increased from \$6652 per mile in 1888 to \$7213 in 1892, has fallen to \$6050 in 1895, and the net earnings, which increased from \$2305 in 1888 to \$2404 in 1892, were down to \$1968 in 1895.

The total volume of freight traffic amounted in 1889 to 448,069 tons per mile of line and in 1895 to 479,490 tons per mile. In 1889 the earnings from freight service were \$4205 per mile and in 1895 \$4130 per mile.

The passenger traffic, which represented 75,325 passengers per mile of line in 1889, with earnings from passenger train service, including express and mails, of \$1957 per mile, had diminished in 1895 to 68,572 passengers per mile with train earnings of \$1765 per mile. In the meantime the rate per ton mile on freight had decreased from 0.922 cents per ton mile to 0.839 cents, and the rate per passenger mile from 2.165 cents to 2.040 cents. These seem but minute discriminations, but when applied to the traffic of 1895 of 85,227,515,891 ton miles and 12,188,466,271 passenger miles, they amount to a total decrease in net earnings of \$86,974,395. This is nearly \$2,000,000 more than the entire amount which was paid out for dividends in 1895, and the fact here stated serves to show how important it is to the welfare of the railroad property in this country that there should be a substantial assurance of the maintenance of rates.

We have now before us the facts as to railroad operations for eight years from the establishment of the Inter-State Commerce Commission; facts compiled by that body and

included in its annual reports, official, impartial, and therefore irrefutable. They prove that, with unrestricted competition, the tendency of rates of transportation is inevitably downward; that in these eight years, or rather in seven years from 1889, the reduction in rates has resulted in a loss of net revenue in 1895 greater than the entire amount applied to dividends in that year. Is not that a calamity to the country? If we are to disregard the interests of those whose capital is interested in these useful enterprises, without hope of return; the little all of many a widow and orphan, the trust funds of charitable and educational institutions; are we to disregard the welfare of nearly ninety thousand men who were dropped from the railroad pay-rolls in 1895 in the effort to decrease expenses with decreasing income? The cries of the widow and orphans may not be heard when deprived of the little pittance of a railroad dividend, but the threats of the army of nearly a million stalwart railroad employees will be, when it dawns upon their minds that their ranks are to be decimated and their wages reduced, so that the United States may boast of continually decreasing rates of railroad transportation.

Our country has just aligned itself on the line of protection to our home industries, avowedly in the interest of the factory employee and the miner; the prices of the products of their labor are to be advanced that their wages may be increased. Let some part of this advance go to the railroad employees also, to the men who receive nearly one half of the gross railroad earnings. Not by legislative enactment, but by granting permission to the railroad managements of the country to charge the published rates; to protect themselves against the reckless competition and, in frequent instances, the fraudulent conduct of a small minority of their number.

As matters now stand, the honest, the conscientious railroad managers are powerless for good. If they seek to conduct their business honestly, to treat all shippers alike,

to demand the published rates without discrimination of persons, their business leaves them and goes to their unscrupulous competitors, and this, too, in the face of a law which explicitly makes such discrimination a crime. Yet that which the law denounces in one breath, in another it justifies. The bulwark which it erects for the protection of the law-abiding railroad manager and the unsuspecting shipper is undermined by connivance between cunning traffic officials and favored shippers.

There is no discrimination so unjust, so hateful, as that which selects a patron in each line of trade in each commercial center, and secretly sustains him in his rivalry with his competitors by rebates and other substantial favors. Necessarily the one so favored will continually increase his own business at the expense of his defenseless rivals. And this is what is going on all over this country; in nearly every line of business, the lion's share is thus being diverted into the den of the crafty fox. And all the time the law denounces this unjust discrimination as a crime, with penalty of fine and imprisonment! Since the law denounces these practises, why does not the honest manager invoke its protection? Because it is useless for him to run counter to the selfish interests of heavy shippers and enter into the courts of justice, where the public prosecutor, the Inter-State Commerce Commission, has so signally failed.

As a fact, public opinion bars the way to a successful application of the law against individual discrimination. What the shipper wants is not uniform rates, but a lower rate in secret than his neighbor can obtain. The railroad manager finds no support from this source and finds his competitive business enticed away from him by stratagems which he cannot employ and remain a law-abiding citizen. It is, of course, impracticable to obtain accurate information as to the effect of these practices upon railroad earnings, but from my personal opportunities for observation

I have formed the opinion that the net earnings from competitive freight traffic are reduced not less than 10 per cent. by unjust discrimination in favor of individuals.

Admitting the extent of this evil, where shall we look for a remedy? To further legislation? To more extended power to the railroad commissions? Let him who can find encouragement in what has already been done, suggest what further can be done in either direction.

There is, however, another plan which has this argument in its favor: that it recognizes the Christian doctrine of leading us not into temptation. Take away the temptation from the traffic official to buy the favor of the powerful patron, and unjust individual discrimination will cease. And there is no practical way to remove this temptation except by agreement among the officials themselves. Make it lawful for them to enter into such agreements, and they will apply the remedy in accordance with the law as at present enacted, without unjust discrimination between persons or communities, to the great benefit of the honest shipper, of the widow or orphan whose mite is invested in railroad property, and of the army of employees whose daily wages must surely be cut down if unjust discrimination is to continue.

The other side of the proposition is that, if railroad managers are permitted to contract among themselves, they may agree to the public injury. Is the right of contract, that precious right for which battles have been waged and governments overthrown, the slow growth of centuries and the boast of civilization, to be lightly set aside where thousands of millions of dollars are invested?

To justify so palpable an encroachment upon the rights of property, great evils to the body politic must clearly be shown to have ensued from such contracts in the past. Let the evidence be produced—or, to meet the possibility of such a result, if traffic agreements are to be legalized, let them be duly filed with the Inter-State Commerce Com-

mission. Let that commission exert itself in the courts in such matters as vigorously and intelligently as it has heretofore with the railroad companies, and our courts of equity will find a ready way to interfere by restraining orders where a fair showing can be made that the rights of third parties are unjustly affected by such agreements. Why not give this plan a trial? In the interest of the investor, of the shipper, of the railroad employees, of honor and integrity, of respect for the law, why not give it a trial? Competition will then be aboveboard. The interests of either individuals or communities can be far more readily protected from the effect of such open lawful agreements than from agreements secretly concocted and carried out by connivance and fraud.



## TRAFFIC STATISTICS, 1888 TO 1895.

| In Cents.                           | 1888.  | 1889.  | 1890.  | 1891.   |
|-------------------------------------|--------|--------|--------|---------|
| Rate per passenger mile .....       | 2.349  | 2.165  | 2.167  | 2.142   |
| Cost per passenger mile .....       | 2.042  | 1.993  | 1.917  | 1.910   |
| Net per passenger mile .....        | 0.307  | 0.172  | 0.250  | 0.232   |
| Rate per ton mile .....             | 1.001  | 0.922  | 0.941  | 0.895   |
| Cost per ton mile .....             | 0.630  | 0.593  | 0.604  | 0.583   |
| Net per ton mile .....              | 0.371  | 0.329  | 0.337  | 0.312   |
| Rate per passenger train mile ..... | 113.92 | 106.28 | 108.04 | 106.111 |
| Cost per passenger train mile ..... | 84.69  | 83.06  | 80.98  | 80.453  |
| Net per passenger train mile .....  | 29.23  | 23.22  | 27.06  | 25.658  |
| Rate per freight train mile .....   | 165.71 | 165.37 | 165.43 | 163.68  |
| Cost per freight train mile .....   | 103.87 | 106.48 | 105.71 | 106.17  |
| Net per freight train mile .....    | 61.84  | 58.89  | 59.72  | 57.51   |

| In Cents.                           | 1892.  | 1893.  | 1894.  | 1895.  |
|-------------------------------------|--------|--------|--------|--------|
| Rate per passenger mile .....       | 2.126  | 2.108  | 1.986  | 2.040  |
| Cost per passenger mile .....       | 1.939  | 1.955  | 1.720  | 2.000  |
| Net per passenger mile .....        | 0.187  | 0.153  | 0.266  | 0.040  |
| Rate per ton mile .....             | 0.898  | 0.878  | 0.860  | 0.8.9  |
| Cost per ton mile .....             | 0.582  | 0.579  | 0.595  | 0.555  |
| Net per ton mile .....              | 0.316  | 0.299  | 0.265  | 0.284  |
| Rate per passenger train mile ..... | 106.87 | 106.81 | 104.89 | 97.87  |
| Cost per passenger train mile ..... | 81.93  | 82.94  | 75.37  | 76.78  |
| Net per passenger train mile .....  | 24.94  | 23.87  | 29.52  | 21.09  |
| Rate per freight train mile .....   | 164.61 | 162.72 | 155.74 | 135.94 |
| Cost per freight train mile .....   | 106.19 | 106.76 | 107.38 | 105.96 |
| Net per freight train mile .....    | 58.42  | 55.96  | 48.36  | 29.98  |

N.B.—The figures as to cost are approximate for 1894 and 1885.

## ANALYSIS OF TRAFFIC EARNINGS, FROM 1888 TO 1895.

|   | 1888.     | 1889.     | 1890.     | 1891.     | 1892.     | 1893.     | 1894.     | 1895.     |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|   | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. | Per Cent. |
| Passenger revenue.....                        | .....     | .....     | 24.79     | 25.64     | 24.46     | 24.70     | 26.56     | 23.45     |
| Mail.....                                     | .....     | .....     | 2.32      | 2.37      | 2.33      | 2.30      | 2.80      | 2.88      |
| Express.....                                  | .....     | .....     | 1.92      | 1.97      | 1.89      | 1.93      | 2.16      | 2.26      |
| Other earnings, passenger service.....        | .....     | .....     | .47       | .49       | .50       | .53       | .58       | .57       |
| Total passenger service.....                  | 30.5      | 31.1      | 29.40     | 30.37     | 29.16     | 29.49     | 32.11     | 29.16     |
| Freight revenue.....                          | .....     | .....     | 67.93     | 67.17     | 68.24     | 67.92     | 65.16     | 67.88     |
| Other earnings, freight service.....          | .....     | .....     | .31       | .28       | .34       | .31       | .33       | .39       |
| Total freight service.....                    | 67.4      | 66.8      | 68.24     | 67.45     | 68.58     | 68.23     | 65.49     | 68.27     |
| Other earnings from operations.....           | 2.1       | 2.0       | 2.31      | 2.17      | 2.25      | 2.27      | 2.38      | 2.52      |
| Unclassified.....                             | .....     | 0.1       | .05       | .01       | .01       | .01       | .02       | .05       |
| EARNINGS.                                     |           |           |           |           |           |           |           |           |
| Total passenger service per mile of line..... | \$2,026   | \$1,957   | \$1,979   | \$2,065   | \$2,104   | \$2,110   | \$1,962   | \$1,765   |
| Total freight service per mile of line.....   | 4,480     | 4,205     | 4,590     | 4,587     | 4,947     | 4,881     | 4,001     | 4,130     |
| Total other operations per mile of line.....  | 146       | 128       | 156       | 148       | 162       | 162       | 146       | 155       |
| Total all operations per mile of line.....    | \$6,652   | \$6,290   | \$6,725   | \$6,800   | \$7,213   | \$7,153   | \$6,109   | \$6,050   |
| Passenger miles per miles of line.....        | .....     | 75,325    | 75,751    | 79,641    | 82,284    | 83,378    | 81,333    | 68,572    |
| Ton miles per mile of line.....               | .....     | 448,069   | 487,945   | 502,705   | 543,366   | 546,401   | 457,354   | 478,490   |
| Passenger train miles per mile of line.....   | .....     | 1,807     | 1,926     | 1,909     | 1,855     | 1,966     | 1,888     | 1,781     |
| Freight train miles per mile of line.....     | .....     | 2,498     | 2,782     | 2,767     | 2,989     | 2,980     | 2,542     | 2,527     |
| Average number of passengers per train.....   | .....     | 41        | 42        | 42        | 42        | 42        | 43        | 38        |
| Average number of tons per train.....         | .....     | 175.12    | 179.35    | 181.67    | 181.79    | 183.97    | 179.88    | 189.74    |

## STATISTICS AS TO CAPITAL, FROM 1888 TO 1895.

|  | 1888.    | 1889.    | 1890.    | 1891.    | 1892.    | 1893.    | 1894.    | 1895.    |
|--|----------|----------|----------|----------|----------|----------|----------|----------|
| Common stock, per mile of line..                               | \$24,411 | \$23,974 | \$24,317 | \$23,539 | \$24,500 | \$23,333 | \$23,357 | \$23,639 |
| Preferred stock, per mile of line..                            | 3,821    | 3,742    | 3,877    | 4,058    | 4,029    | 4,025    | 4,157    | 4,273    |
| Total stock, per mile of line..                                | \$28,232 | \$27,716 | \$28,194 | \$27,597 | \$28,529 | \$27,358 | \$27,514 | \$27,912 |
| Bonds, per mile of line .....                                  | 27,880   | 27,822   | 26,367   | 30,012   | 26,494   | 26,394   | 26,147   | 26,114   |
| Stock and bonds, per mile of line.....                         | \$56,112 | \$55,538 | \$54,561 | \$57,609 | \$55,023 | \$54,752 | \$53,662 | \$54,026 |
| Gross earnings, per mile of line...                            | \$6,652  | \$6,290  | \$6,725  | \$6,800  | \$7,213  | \$7,153  | \$6,109  | \$6,050  |
| Proportion of gross to stock and bonds, per mile of line ..... | 11.8     | 11.3     | 12.3     | 11.7     | 13.1     | 13.0     | 11.3     | 11.2     |
| Net earnings, per mile of line                                 | \$2,305  | \$2,087  | \$ 2,300 | \$2,262  | \$2,404  | \$2,277  | \$1,946  | \$1,968  |
| Proportion of net to stock and bonds, per mile of line.....    | 4.0      | 3.7      | 4.2      | 3.9      | 4.3      | 4.1      | 3.6      | 3.6      |

## ANALYSIS OF OPERATING EXPENSES, FROM 1888 TO 1895.

|  | 1888.          | 1889.          | 1890.          | 1891.          | 1892.          | 1893.          | 1894.          | 1895.          |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|  | Per Cent.      | Per Cent.      | Per Cent.      | Per Cent.      | Per Cent.      | Per Cent.      | Per Cent.      | Per Cent.      |
| Maintenance of way and structures..                      | 22.60          | 22.46          | 22.06          | 21.00          | 21.02          | 20.45          | 19.64          | 19.84          |
| Maintenance of equipment .....                           | 17.09          | 16.55          | 16.48          | 15.99          | 16.48          | 16.53          | 15.43          | 15.68          |
| Conducting transportation.....                           | 50.26          | 51.33          | 51.18          | 52.51          | 52.08          | 52.60          | 53.94          | 59.41          |
| General expenses.....                                    | 9.34           | 9.44           | 10.15          | 10.38          | 10.33          | 10.33          | 10.91          | 4.95           |
| Unclassified .....                                       | .71            | .22            | .13            | .12            | .09            | .09            | .08            | .12            |
| Total expense to total earnings<br>from operations ..... | .653           | .668           | .657           | .667           | .666           | .678           | .681           | .674           |
| Cost per ton mile.....                                   | Cents.<br>.630 | Cents.<br>.593 | Cents.<br>.604 | Cents.<br>.583 | Cents.<br>.583 | Cents.<br>.579 | Cents.<br>.611 | Cents.<br>.561 |
| Cost per passenger mile.....                             | 2.042          | 1.993          | 1.917          | 1.910          | 1.939          | 1.955          | 1.720          | 1.964          |
| Cost per freight train mile.....                         | 103.8          | 106.4          | 105.7          | 106.1          | 106.1          | 106.7          | 109.9          | 106.6          |
| Cost per passenger train mile.....                       | 84.69          | 83.06          | 80.98          | 80.45          | 81.93          | 82.94          | 75.37          | 76.78          |
| Cost per mile of line.....                               | \$4.347        | \$4.203        | \$4.425        | \$4.538        | \$4.809        | \$4.876        | \$4.163        | \$4.082        |
| Earnings from operations, per mile<br>of line .....      | 6,652          | 6,290          | 6,725          | 6,800          | 7,213          | 7,153          | 6,109          | 6,050          |
| Net earnings from operations,<br>per mile of line .....  | \$2,305        | \$2,087        | \$2,300        | \$2,262        | \$2,404        | \$2,277        | \$1,946        | \$1,968        |
| Miles of line.....                                       | 136,883        | 153,385        | 156,404        | 161,275        | 162,997        | 169,779        | 175,690        | 177,746        |

N.B.—Cost per ton mile, passenger mile, and train mile, approximate for 1894 and 1895.

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